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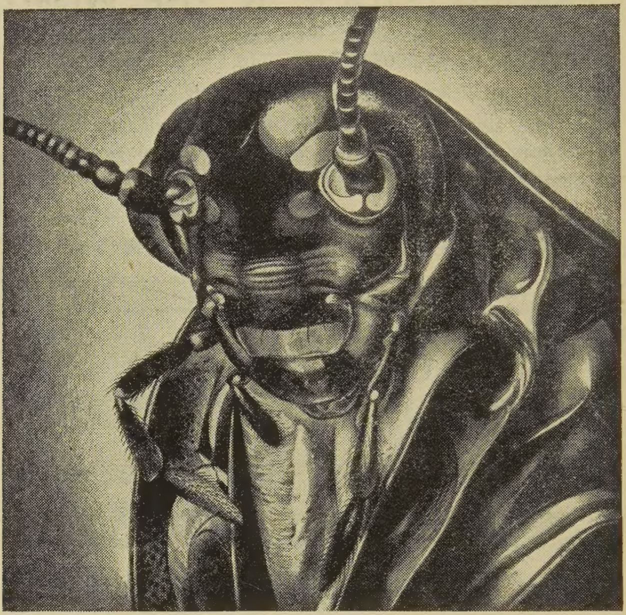

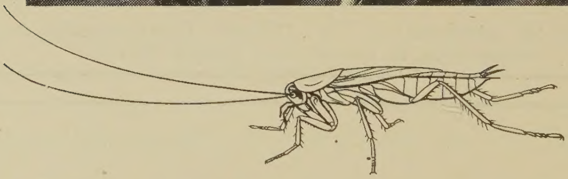

The Cockroach

The cockroach, both 'black beetle' and 'steam fly', is a pest the world over. It is found mostly in bakeries, laundries, distilleries and kitchens of hotels, restaurants and dwelling houses, where warm and moist conditions prevail. It forages in the dark and hides by day in cracks beneath floor boards and in other dark places, where it deposits its eggs. The young closely resemble the adults and take up to twelve months to reach maturity.

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TSOU (T. L.). **A Study on the Problem of double-crop System of Rice in Relation to the Infestation of the Rice Stem-borer in eastern Szechawan.** [*In Chinese.*] —*J. agric. Ass. China* no. 184 pp. 27–38, 1 graph. Nanking, 1947. (With a Summary in English, prelim. pp. 4–6.)

Schoenobius bipunctifer (Wlk.) passes through four generations a year in eastern Szechwan, where two crops of rice are normally grown, and the adults are present between 27th April and 10th May, 10th and 30th June, and 28th July and 12th September, those of the last generation beginning to emerge about 22nd August. Larvae and adults of the preceding generation are the most numerous, and infestation on heads formed between 25th July and 25th August is usually high. Mid-season varieties of rice, which form heads about the middle of July, are grown in eastern Szechwan, and damage by this generation is in consequence usually avoided, but if dry weather in spring delays transplanting, the heads form late and the crop becomes infested. Late crops are more heavily damaged than earlier ones and the amount of damage increases with lateness in planting. Where two crops are grown, damage to the first is only slight, and the second is also less severely infested than late varieties of a single crop. It is pointed out that the number of white-ears produced will be lower where early infestation is high, since heads will not develop on plants containing larvae.

GRANDORI (R.). **Terzo contributo alla lotta contro le altiche del lino mediante Gesarol D.D.T. e prodotti al gammaesano.** [A third Contribution to the Control of the Flax Flea-beetles by Means of DDT Gesarol and Products containing Benzene Hexachloride.]—*Boll. Zool. agr. Bachic.* **14** fasc. 3 pp. 3–13, 2 refs. Turin, 1947.

Further experiments were carried out in 1947 on the use of DDT against the flax flea-beetles [*Aphthona euphorbiae* (Schr.) and *Longitarsus parvulus* (Payk.)] on seedling flax in Italy [*cf. R.A.E.*, A **36** 268]. Gesarol [4 per cent. DDT (*cf. loc. cit.*)] was applied in sprays at 1 or 2 per cent. and in dusts to give 0·06–0·21 oz. DDT per sq. yard once or twice in April–May to seedlings heavily infested by adults in the Province of Ancona, and the dust treatment was applied once only, in April, to similar seedlings in the Province of Brescia. The results confirmed the effectiveness of DDT, complete mortality of adult flea-beetles being given by all treatments in 1–2 days. There was some reinfestation by larvae in early May on the plots in the second experiment, doubtless due to oviposition before treatment, and adults appeared at the end of the month, but damage was very light compared with the controls. The yield was more than doubled in each test, with no appreciable differences between treatments, and a second application is therefore considered unnecessary unless reinfestation is excessive. The sprays are shown to be cheaper than the dusts.

A small-scale experiment was also carried out in April with Tiogamma containing 3 per cent. benzene hexachloride and 3 per cent. thiocyanates, applied as a dust at 16·2 lb. per acre to flax seedlings heavily infested by adult flea-beetles. These showed signs of distress within an hour, all had left the plants and 80 per cent. were dead on the ground after five hours, and all were dead after ten hours. There was no reinfestation after ten days, and the odour of the product was still distinct. A few larvae were observed in May.

GRANDORI (R.). **Bachi da seta e D.D.T.** [Silkworms and DDT.]—*Boll. Zool. agr. Bachic.* **14** fasc. 3 pp. 15–23, 3 refs. Turin, 1947.

The author gives an account of experiments in Italy in 1947 showing that silkworms [*Bombyx mori* (L.)] were affected by suspension sprays of DDT only if they came into contact with the spray or the deposit left by it, and were not harmed when introduced into rooms that had been sprayed with such suspensions or with suspensions of Tiogamma (benzene hexachloride and thiocyanates) so long as contact with the deposits was prevented. After these were concluded, he learned of the work of P. L. Lombardi [*cf.* *R.A.E.*, A **38** 391], in which silkworms were killed when introduced into rooms sprayed several days previously with solutions or emulsified solutions of DDT, even though there was no contact with the deposits. He attributes this to the persistence in the air of fine spray droplets, and concludes that suspension sprays are safer for use where silkworms may be affected.

DOMENICHINI (G.). **Apparizione di cavallette in Lombardia.** [Infestation by Grasshoppers in Lombardy.]—*Boll. Zool. agr. Bachic.* **14** fasc. 3 pp. 27–43, 2 figs., 7 refs. Turin, 1947.

Notes are given on several small local outbreaks of Acridids and Tettigoniids in Lombardy in 1947 and of tests on the control of some of them. The most injurious were *Calliptamus italicus* (L.) and *Decticus verrucivorus* (L.). When applied as a dust at 12·6–14·4 lb. per acre against *Calliptamus*, Tiogamma containing 3 per cent. BHC (benzene hexachloride) and 3 per cent. thiocyanates proved effective against the young nymphs but gave only 40–50 per cent. mortality of older ones, Tiogamma containing 10 per cent. BHC was effective against nymphs in all instars, but gave only 70–80 per cent. mortality of the adults, and Tiogamma containing 20 per cent. BHC was effective against both nymphs and adults. The toxicity of the deposit was maintained for a few days but disappeared in a week, or sooner if rain fell. Even the strongest Tiogamma dust had little effect on adults of *Decticus*, however.

MORETTI (G.). **Tossicità di alcuni composti clorurati per gli adulti di *Oryzaephilus surinamensis* L. (Coleoptera—Cucujidae).** [The Toxicity of some chlorinated Compounds to the Adults of *O. surinamensis*.]—*Boll. Soc. ent. ital.* **78** no. 1–2 pp. 4–10, 1 graph, 13 refs. Genoa, 1948.

Having observed that BHC (benzene hexachloride) was more effective than DDT against *Calandra granaria*, L., *C. oryzae* (L.), *Tribolium castaneum* (Hbst.) (*ferrugineum* (F.)) and *Laemophloeus ferrugineus* (Steph.) but less so against *Oryzaephilus surinamensis* (L.), the author carried out detailed laboratory tests with various chlorinated hydrocarbon insecticides against adults of the last-named. When batches of six beetles each were placed in covered dishes treated 16 days previously with 5 per cent. of the insecticides adsorbed on talc, all were dead after 36–72 hours for DDT, whereas four and one were dead for BHC and toxaphene (chlorinated camphene), respectively. When the deposit in the DDT dish was 57 days old, it was compared with a dish freshly treated with chlordan. DDT gave complete mortality in 56 hours, but the beetles exposed to chlordan were all alive after eight days, though some appeared affected. In the next test, glass tubes (10×2 cm. in size) were treated with the 5 per cent. dusts and the excess shaken out, so that 10 mg. remained adhering. Ten beetles were placed in each and the tubes covered with metal screen. BHC and DDT had killed three and five beetles in 36 hours, respectively, and all in 72 hours, and toxaphene killed three beetles, in 36–160 hours. In a further test by this technique, DDT and BHC gave complete mortality in 48–60 hours and 60–72 hours, while for chlordan, torpor was observed after eight days and death after ten. When powders containing 8 per cent. DDT and BHC were used, all ten beetles became inert in 48 hours for DDT and two for BHC. The effect was then tested of placing 20 beetles in tubes containing 1 mg. 5 per cent. insecticide in talc mixed with 1 gm. coarse-ground maize flour. DDT caused some loss of movement in 25 days and no further symptoms in 35 days, while BHC and toxaphene caused slight torpor only. Batches of ten beetles were then placed in tubes each treated with 1 gm. insecticide in acetone, which was allowed to evaporate. BHC and DDT killed all ten in 36–160 hours, while toxaphene killed three only, in 48–160 hours. Beetles exposed to chlordan adsorbed on blotting paper showed signs of poisoning in six days, and death occurred in eight.

JANNONE (G.). **Studi e ricerche di entomologia agraria in Eritrea e in Etiopia. IV. Rinvenimento e osservazioni relative al** *Pantomorus* (*Asynonychus*) *godmani*, **Crotch 1867 (Col., Curcul.) in Eritrea.** [Studies and Researches in Agricultural Entomology in Eritrea and Abyssinia. IV. The Finding of *P. godmani* in Eritrea and Observations on it.]—*Boll. Soc. ent. ital.* **78** no. 3–4 pp. 18–25, 1 fig., 15 refs. Genoa, 1948.

In this part of a series [*cf. R.A.E.*, A **37** 458 ; **38** 43, 131], the author reports the finding for the first time in Eritrea of *Pantomorus godmani* (Crotch), adults of which were observed on *Dahlia* in a garden in Asmara in June 1945. The infestation occurred suddenly, and the weevils fed in small groups on the leaves, soiling the plants with their excreta. Their emergence from the soil, which was in general very dry in June, had apparently been favoured by watering the beds. The weevils became less numerous in July and had disappeared by the end of August. Eggs were found in the soil and in cracks in the bark of the trunks of neighbouring *Vernonia*, *Eucalyptus* and *Schinus molle*. Infestation of *Dahlia* recurred in June–July 1946 in the same place, and damage to the leaves was again severe, but the plants flowered normally in both years. No other plants in the garden were attacked, but a few adults were collected on *Acacia* in another locality in January 1946.

The world distribution of the weevil is described, and ways in which it might have reached Eritrea discussed.

In a small laboratory test in 1945, batches of adults were placed in covered but not hermetically sealed dishes containing a fine layer of benzene hexachloride on the bottom. All were on their backs after seven hours and appeared paralysed. Some were then taken out of the dishes, but all were dead in 36 hours and in the same position as those left in.

MARTELLI (M.) & SERVADEI (A.). **Orientamenti tecnici ed economici nella lotta contro le tentredini del susino.** [Technical and economic Experiments on the Control of the Plum Sawflies.]—*Ann. Sper. agr.* (N.S.) **2** no. 1 pp. 129–138, 9 refs. Rome, 1948. (With a Summary in English.)

The authors summarise the life-history of *Hoplocampa flava* (L.) and *H. minuta* (Christ) on plum in Italy [*cf. R.A.E.*, A **38** 43] and describe experiments on their control carried out near Pistoia in the spring of 1947. The percentage infestation of young fruits on the controls ranged from 50 to 70, and this was reduced to 1–2 by a spray of 2 per cent. quassia (which is harmless to bees) during blossoming, followed by two of 0·5 per cent. lead arsenate, at petal fall and when the fruitlets were well formed, and also by three sprays of 1 per cent. Gesarol (a proprietary preparation of DDT) at the same periods. Two applications of DDT spray reduced it to 8–10, and two of a DDT dust to 25. The most effective DDT treatment was more expensive than that employing quassia and lead arsenate, and the latter is therefore recommended.

ZOGG (H.), HORBER (E.) & SALZMANN (R.). **Bericht über die Tätigkeit der Eidg. landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1946/47. 8. Pflanzenschutz.** [Report of the Federal Agricultural Experiment Station Zürich-Oerlikon for 1946–47. 8. Plant Protection.]—*Landw. Jb. Schweiz* **62** pt. 5 pp. 460–470, 1 fig., 2 refs. Berne, 1948.

This report includes notes on the more important pests of crops in Switzerland in the calendar year 1947 and their control. Those that caused considerable damage to cereals included the wireworms, *Agriotes obscurus* (L.), *A. lineatus* (L.), *A. sputator* (L.) and *Lacon murinus* (L.), *Cephus pygmaeus* (L.) on wheat and rye, *Oscinella frit* (L.) on oats and barley, *Gryllotalpa gryllotalpa* (L.) (*vulgaris* Latr.), which was most injurious to barley, and *Eurygaster maura* (L.) and *E. austriaca* (Schr.), which were more abundant on the maturing crops than in any of the preceding years. The development of the potato beetle [*Leptinotarsa decemlineata* (Say)] was accelerated by hot weather and it continued to spread ; immigration from the west was insignificant, and most of the beetles had overwintered in the soil locally, apparently owing to insufficient control on the dense growth of potatoes in the previous autumn. Damage was nowhere serious. Beet was severely injured by *Pegomyia hyoscyami* (Panz.) and *Aphis* (*Doralis*) *fabae* Scop., and also by wireworms and larvae of *Silpha* (*Blitophaga*) *opaca* L., *S.* (*B.*) *undata* (Müll.), *Cassida nebulosa* L. and *C. nobilis* L. *Pyrausta nubilalis* (Hb.) damaged maize in the Ticino and in the Rhine Valley of St. Gallen. Rape was injured by *Brevicoryne brassicae* (L.), in addition to the insects recorded in the preceding two or three years [*R.A.E.*, A **37** 445]. Larvae of *Apion apricans* Hbst. and *Hylastes* (*Hylastinus*) *obscurus* (Marsh.) were destructive to clover, and *Hypera* (*Phytonomus*) *variabilis* (Hbst.) and *Sitona* (*Sitones*) *lineatus* (L.) to lucerne. Infestation of stored grain by *Calandra granaria* (L.) became increasingly common, apparently owing to the import of infested maize and barley.

In insecticidal tests, various proprietary dusts and sprays of DDT and BHC (benzene hexachloride) were compared with sprays of 0·4–0·8 per cent. calcium arsenate against larvae and adults of *L. decemlineata.* A DDT suspension gave the best results, and BHC in a dust, a suspension or an emulsified solution tainted the tubers. None of the treatments controlled Aphids. Calcium arsenate, the cheapest material, at 0·4 per cent. is recommended, unless infestation is very heavy, when DDT or derris should be substituted. Various soil treatments with BHC gave good control of wireworms [*cf.* **38** 460] but had little effect on third-year larvae of *Melolontha melolontha* (L.), though they seemed to be discouraged from feeding. Dusts and sprays of BHC gave satisfactory control of larvae of *Ceuthorrhynchus napi* Gylh. and *C. quadridens* (Panz.) on rape in the second half of April ; 2–3 applications are recommended, the first when the rape sprouts and the others at intervals of 7–10 days.

ALFARO (A.). **Algunos aspectos de la biología del crisomélido** *Leptinotarsa decemlineata* **Say.** [Some Aspects of the Biology of *L. decemlineata.*]—*Rev. Acad. Cienc. Zaragoza* (2) **2** fasc. 2 pp. 11–23, 3 graphs, 4 refs. Saragossa, 1947.

This paper contains accounts of laboratory experiments in Spain on the fecundity of overwintered females of *Leptinotarsa decemlineata* (Say) and the effect of temperature on the development of the various stages that have already been noticed from two earlier papers by the author [*R.A.E.*, A **34** 264].

ALFARO (A.). **Notas sobre** *Brachycolus noxius* **Mordw., nueva plaga para nuestros trigos y cebadas.** [Notes on *B. noxius*, a new Pest for our Wheat and Barley.]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 125—130, 7 figs., 5 refs. Madrid, 1947.

In the spring of 1945, wheat and barley in the valley of the Sotón, Province of Huesca, were found to be heavily infested by an Aphid that was identified as *Brachycolus noxius* Mordv. This species, of which the alate and apterous viviparae are described, has not so far been recorded outside the Soviet Union. Very brief notes on its bionomics are given from the Russian literature ; it overwinters in the egg stage on grasses, winter barley and, less often, winter wheat. In Spain, it appeared to have been favoured by a warm dry spring and was most injurious in May, when it occurred in dense colonies at the bases of the undeveloped ears, and some of the plants were killed. The alates flew in large swarms in morning and evening and were carried for considerable distances by wind.

BENLLOCH (M.). **Algunos factores que influyen sobre la suspensibilidad en el agua de los modernos insecticidas orgánicos clorados (D.D.T. y gammahexano).** [Some Factors that affect the Suspensibility in Water of the modern organic chlorinated Insecticides (DDT and Benzene Hexachloride).]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 165–174, 8 graphs, 2 refs. Madrid, 1947.

The author has continued his study of the factors that affect the stability of suspensions of preparations of DDT and BHC (benzene hexachloride) [*cf. R.A.E.*, A **36** 204] and here discusses the results obtained in tests of 32 commercial and laboratory products. Stability was affected by the inert diluents used, which in order of decreasing effectiveness were bentonite, certain kaolins, talc and calcium carbonate, but bentonite sometimes so coated the particles of DDT as to render them ineffective, and some evidence was obtained that prolonged grinding with kaolin had the same effect. Of various adjuvants added to improve suspensibility, sodium caseinate and dextrin were superior to gum in a mixture of BHC and calcium carbonate, and a sodium resinate gave good results with DDT and kaolin at the low rate of 0·2 per mille. The proportion of active ingredient was also important, 1 per cent. of a product containing 5 per cent. DDT giving a more stable suspension than 1 per cent. of a 20 per cent. product, and suspensions prepared with hard water were always inferior to those prepared with soft, even when the product contained no soap. Heat was sometimes beneficial in the preparation of suspensions, especially if the product contained gum.

ALFARO (A.). **La eficacia de los insecticidas agrícolas a base de D.D.T. y 666 en la lucha contra el escarabajo de la patata.** [The Effectiveness of the agricultural Insecticides based on DDT and Benzene Hexachloride for the Control of the Potato Beetle.]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 175–194, 1 ref. Madrid, 1947.

An account is given of numerous experiments in which 16 Spanish commercial spray powders containing DDT or BHC (benzene hexachloride) were tested at 1 per cent. against larvae and adults of *Leptinotarsa decemlineata* (Say) on potato. In order not to prejudice the interests of the manufacturers, the identity of the products is concealed in the tables of results. It is concluded that at the dilution used, products containing 5–6 per cent. high-quality technical DDT are effective against both stages. Products containing 15 per cent. mixed isomers of BHC were somewhat inferior to the best of those containing DDT and should be used at more than 1 per cent. concentration.

RUIZ CASTRO (A.). **Algunas posibles sofisticaciones de los insecticidas arsenicales.** [Possible Ways of adulterating Arsenical Insecticides.]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 195–222, 1 fig., 11 refs. Madrid, 1947.

The arsenicals most used as insecticides in Spain are sodium arsenite, sodium arsenate, copper aceto-arsenite (paris green), calcium arsenate and calcium arsenite, but commercial forms of these are not always pure and are occasionally adulterated. The author therefore discusses the composition of these chemicals, their cost, ways in which an apparently high degree of purity of commercial products could be obtained by the addition of other materials giving an equal content of arsenic, and various methods of analysing arsenicals both qualitatively and quantitatively and detecting substitutions.

BENLLOCH (M.). **Influencia de la humedad y la temperatura sobre la vitalidad y desarrollo de los huevos de langosta.** [The Effect of Humidity and Temperature on the Viability and Development of Locust Eggs.]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 271–274, 3 figs., 1 ref. Madrid, 1947.

In the first of the experiments described, egg-pods of *Dociostaurus maroccanus* (Thnb.) collected from the Province of Córdoba in October 1945 were kept in the laboratory until December and then transferred to a cabinet in which the temperature was 20–25°C. [68–77°F.] and the humidity high. Completely formed embryos and the inversion that precedes hatching were observed on 19th January, and the eggs hatched between 28th January and 14th February, over two months earlier than the normal date of field hatching. In the second test, carried out in the following winter, ten egg-pods were placed in petri dishes on 23rd January, six with damp filter paper and four without, and kept at 21–28°C. [69·8–82·4°F.]. Those with filter paper hatched between 6th February and 5th March, but none of the others had hatched in that time. The latter were placed in a damp chamber at the same temperature on 17th March, and hatching took place between 15th and 29th April, but only 40 per cent. of the eggs hatched. It is concluded that the eggs complete their development before the onset of winter and do not require a period of cold to do so. Hatching depends on humidity, and may occur early or late or be reduced by weather.

DOMÍNGUEZ GARCÍA-TEJERO (F.). **Escarabeidos hortícolas (los "gusanos blancos" de las huertas).** [Lamellicorns of agricultural Importance (Garden White Grubs).]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 275–310, 20 figs., 22 refs. Madrid, 1947.

The author gives a systematic list of the Lamellicorns of which the larvae or adults are injurious to plants in Spain, showing for the more important their distribution there and in other countries and the plants they attack, keys to the genera based on larvae and adults, notes on the morphology of the adults of the more important species, and a review of the bionomics of the group and experiments on control, based on the literature.

GÓMEZ CLEMENTE (F.). **El "picudo" de la platanera** (*Cosmopolites sordidus*, **Germar**). [The Banana Weevil, *C. sordidus*.]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 311–332, 14 figs., 18 refs. Madrid, 1947.

Cosmopolites sordidus (Germ.) was reported for the first time on banana in the Canary Islands in 1945, when it was found on several plantations in the north of the island of Gran Canaria. It appeared to have been present for a considerable number of years, and was probably imported with planting material from Cuba.

A survey undertaken in July 1947 showed that it had spread somewhat from the original focus, probably largely owing to distribution of planting material, but dispersion was fairly slow and infestation scattered. All stages of the weevil and the damage it causes to banana are described. Development appeared to be continuous throughout the year, though with seasonal variations, and probably requires twice as long as in the West Indies [*cf. R.A.E.*, A **14** 176]. All stages were present in July, though larvae were the most numerous, up to 24 being found in individual plants. Pieces of stem had been set out as baits for the adults in an attempt to control the weevil, and the numbers taken reached peaks in January, October, November and December in one area, and in November, February and March in another in 1946, but these peaks are not thought to represent distinct generations. Fewer were taken in 1947 than in 1946, and this is attributed to the use of the baits and the destruction of infested plants.

It is recommended that the usual measures should be taken to prevent the spread of the weevil and that the control measures already practised should be intensified. Notes on the possible use of insecticides and imported natural enemies are appended.

DEL CAÑIZO GOMEZ (J.). **Las plagas de insectos y su importancia en la economía agrícola española.** [Insect Pests and their Importance in Spanish Agriculture.]—*Bol. Pat. veg. Ent. agríc.* **15** pp. 333–344, refs. Madrid, 1947.

Notes are given on insect pests of crops in Spain that do not occur, are less injurious or are represented by other forms in the rest of Europe, together with a brief survey of the species that constitute the main problems for the agricultural entomologist there. It is calculated that the losses caused by insect damage to crops in Spain in 1943 amounted to at least 2,500 million pesetas.

MELIS (A.). **Cenni storici sulla comparsa e diffusione dell'*Aspidiotus perniciosus* Comst. in Italia.** [Notes on the History of the Appearance and Spread of *Quadraspidiotus perniciosus* in Italy.]—*Redia* **32** pp. 1–29, 6 refs. Florence, 1947.

An account is given of the history of the discovery of *Quadraspidiotus* (*Aspidiotus*) *perniciosus* (Comst.) in Italy, where it was first observed in 1939 on nursery stock at Versilia, in the Province of Lucca, the subsequent investigations that showed it to be also present on fruit trees at numerous places in northern and central Italy and the work undertaken for its control [*cf. R.A.E.*, A **31** 180 ; **36** 64 ; **37** 446]. It had apparently been introduced some years previously on nursery stock from the United States, and as a result of the campaign undertaken was nowhere numerous in 1947. Since tests have shown that infestation can hardly be spread by means of fruit or fruit peel [**36** 64] and the Coccid is now widely distributed in Europe, the author considers that there is little benefit to be derived from restricting international trade in fruit beyond the enforcement of the normal quarantine precautions and that the matter should be discussed at an international conference of European countries.

MELIS (A.). **L'attività antidacica durante il secondo conflitto mondiale e nell'immediato dopoguerra in Italia.** [Work in Italy on the Control of *Dacus oleae* during and immediately after the second World War.]—*Redia* **32** pp. 47–114, 1 fldg. pl., refs. Florence, 1947.

The author reviews at length from the literature and comments on work carried out since 1940 in connection with the control of *Dacus oleae* (Gmel.) on olive in Italy [*cf. R.A.E.*, A **35** 379; **39** 33] and Tripolitania [*cf.* **31** 182], including papers read at a conference at Florence in 1942, and describes experiments on the use of DDT and BHC (benzene hexachloride) in Tuscany in 1947. Fruttasan and Agritox (wettable powders containing 12 per cent. DDT and BHC, respectively) were used at 2 per cent. in sprays, and Pulvisan and Pulvitox (5 per cent. DDT and BHC, respectively) as dusts, and applications were made on 7th–8th July, 8th August (for the dusts only) and 8th–9th September. A BHC preparation (Toxin) that was miscible at up to 0·7 per cent. in molasses was used to prepare a bait-spray, the mixture being diluted to contain 0·07 per cent. BHC, and this was applied at a rate rather higher than normally used for a bait-spray on 7th–8th July, 8th August, 8th September and 14th October. A bait-spray of 2·5 per cent. sodium arsenite in molasses diluted to 10 per cent. in water was used for comparison, and was applied on 7th–8th July, 8th August and 8th October. Fly activity was negligible until September, when infestation occurred on untreated trees, and up to 100 per cent. of the crop was infested in some places by early November. The DDT and BHC dusts and sprays gave complete protection, with very few fallen fruits, the BHC bait-spray resulted in 6·03–59·39 per cent. infestation and the sodium-arsenite bait-spray in 6·01–7·65 per cent.

Since the results recorded for DDT were superior to those obtained by Grandori [**39** 33], who used it in the form of Gesarol dust, the author tested the toxicity of the latter by exposing adults of *D. oleae* in various ways to deposits of Gesarol. The results were excellent, and *Dacus* was even more susceptible to the deposits than adults of *Musca domestica* L.

MARTELLI (G.). **Nuovi frutti ospiti della *Ceratitis capitata*, Wied., in Italia.** [New Host Fruits of *C. capitata* in Italy.]—*Redia* **32** pp. 115–118, 4 refs. Florence, 1947.

From occasional observations in southern Italy and Sicily, notes are given on attack by *Ceratitis capitata* (Wied.) on several fruits not mentioned by Costantino [*R.A.E.*, A **18** 179, 457] for that area. In Sicily, larvae were found in pomegranates, though laboratory tests showed that only the older individuals could attack the undamaged seeds, and in grapes, almonds and dates, and on the mainland, grapes were punctured by the adults, possibly for feeding, and larvae were found in peppers (*Capsicum annuum*).

SERVADEI (A.). **Il *Tychius flavus* Becker (Col. Curculionidae) (IV contributo alla conoscenza dell'entomofauna delle leguminose foraggere).** [*T. flavus* (Fourth Contribution to the Knowledge of the Insect Fauna of leguminous Fodder Plants).]—*Redia* **32** pp. 141–174, 28 figs., 19 refs. Florence, 1947.

In this part of a series [*cf. R.A.E.*, A **36** 115, etc.], detailed descriptions are given of all stages of *Tychius flavus* Becker, and it is stated that whereas this weevil, which attacks lucerne, has previously been recorded in Italy from the northern regions, it was recently observed near Florence, where infestation of the pods reached 50 per cent. in some fields in the spring of 1945, and near Bologna, where, however, it was of negligible importance. Observations on its bionomics were made near Florence over three years. They showed that it has one generation a year. The adults overwinter in the cocoons in the soil, which they leave in early April. They feed on the young leaves of the lucerne and pair in mid-May, and the females deposit their eggs about a week later in the pods, on which they also feed. The larvae hatch in about ten days and feed on the seeds, leaving the epidermis only. After a fortnight they leave the pods, drop to the ground and form cocoons in the upper inch of the soil in which they pupate. The pupal stage lasts another fortnight. Adults removed from their cocoons during winter moved about sluggishly and did not feed or pair, but became normally active in spring. Infestation was lower in 1946 and 1947, and this is attributed largely to parasitism of the larvae by an unidentified Braconid. Since the larvae cannot be reached by insecticides, the only control method available is to cut the lucerne early and use it for fodder or silage.

SERVADEI (A.) & MARTELLI (M.). **Calciocianamide e DDT nella lotta contro l'*Hoplocampa brevis*, Klug.** [Calcium Cyanamide and DDT in the Control of *H. brevis*.]—*Redia* **32** pp. 183–186, 3 refs. Florence, 1947.

In tests against *Hoplocampa brevis* (Klug) on pear in Tuscany in 1947, calcium cyanamide was incorporated into the soil beneath the trees at a rate equivalent to 720 lb. per acre in early March, about 20–30 days before the mass emergence of adults takes place, in an attempt to kill the larvae in their cocoons. The results were disappointing, subsequent infestation being reduced from 14 per cent. in the controls to 10–11 per cent. This is attributed to rapid decomposition of the cyanamide in the soil and the protection against its action afforded by the cocoons. Better control was given by two applications of DDT to the trees, the first at flowering time and the second a fortnight later, a proprietary powder (Gesarol) reducing infestation to 4·81 per cent. as a dust and 1·93 per cent. as a 1 per cent. spray, again as compared with 14 per cent. for no treatment.

GOLFARI (L.). **Appunti sulla etologia di alcuni afidi del pesco** (*Anuraphis schwartzi* **Börn.,** *Anuraphis persicae-niger* **Smith,** *Myzus persicae* **Sulz.**). [Notes on the Ethology of certain Peach Aphids.]—*Boll. Ist. Ent. Bologna* **16** pp. 115–128, 1 pl., 26 refs. Bologna, 1947.

Accounts based on observations at Cesena, Emilia, in 1943–46 are given of the seasonal cycles of development of *Anuraphis schwartzi* (Börn.), *A. persicae-niger* (Smith) and *Myzus persicae* (Sulz.) on peach, to which they cause more injury than any other Aphid in Italy except *Hyalopterus arundinis* (F.). The following is based on the author's summary. *A. schwartzi* hibernates on peach chiefly as a winter egg on the branches and less commonly as virginogeniae in the dry curled leaves remaining on the trees. Infestation is spread from one tree to another by the alate migrants, which appear from May onwards and belong to the third and successive generations. The oviparae and the males appear among the virginogeniae from October onwards, and winter eggs are laid until December. The oviparae and their eggs are attacked in autumn and winter, respectively, by the Oribatid mite, *Oribatula tibialis* (Nic.).

A. persicae-niger usually hibernates as the virginogenia on the roots of peach, but in certain years winter eggs are laid on the younger branches after the leaves have fallen. Infestation is spread from tree to tree in spring by the apterous virginoparae. Alate migrants appear in May and June and migrate to some unknown summer food-plant. Sexuparae gynoparae and males return to the leaves of peach in autumn.

M. persicae hibernates in the winter egg on the young branches of peach and other rosaceous plants and rarely as the virginogenia on wild herbaceous plants, particularly *Mercurialis annua*. It is the first of the various peach

Aphids to become active and to leave the trees in spring and the last to cease oviposition in autumn. Owing to the early spring migration, damage to peach is not great.

GHIDINI (G. M.). **L'impiego di "attogrammi" nel saggio biologico degli insetticidi.** [The Use of "Actograms" in biological Tests of Insecticides.] —*Boll. Ist. Ent. Bologna* **16** pp. 279–290, 6 figs., 16 refs. Bologna, 1947.

The author reviews various methods that have been proposed for biological tests of contact insecticides and describes an apparatus devised by him for the purpose, termed the Ghidini actometer. It includes a small horizontal drum above which a test insect is suspended in such a way that it turns the drum with the movements of its legs. One end of the metal axle of the drum revolves in a small mercury bath, and close to the other end of the axle is attached a metal disk from the circumference of which metal prongs project and dip into another mercury bath as the drum is rotated. An electric current passes through the axle when a prong makes contact with the mercury and each successive contact is recorded by a needle on a chart, termed an actogram, held on a revolving cylinder. Blotting paper impregnated with the insecticide under test can be placed round the drum beneath the insect and left in place for any period desired, or replaced by untreated paper after a given interval, and treated paper of any age can be tested once or repeatedly, or the insect itself can be treated before being placed in the apparatus. A fumigant can be tested by enclosing the test insect in a container with it.

The test insects used by the author included larvae of *Tenebrio molitor* L., which were held in a tube so that the forepart of the body, including the legs, was free, and adults of *Formica rufa pratensis* Retz. and *Calliphora vomitoria* (L.), which were suspended from a swivel by a wire fixed round them between the thorax and abdomen. Typical actograms obtained with the first two insects are reproduced.

FIORI (G.). **Contributo alla conoscenza degli insetti del *Daucus carota* L.** [A Contribution to the Knowledge of the Insects of Carrot.]—*Boll. Ist. Ent. Bologna* **16** pp. 291–314, 17 figs., 12 refs. Bologna, 1947.

About 70 per cent. of carrots in fields in the district of Modena were infested by *Phalonia zephyrana* (Treitschke) in the autumn of 1946 and some of them also by the Lamiid, *Phytoecia cylindrica* (L.). The adults and larvae of these two insects are described, and accounts are given of their bionomics based on field observations. Both are widely distributed in Italy. The Phaloniid has three generations in the year. It overwinters in the larval stage in cocoons, and occasionally some of the second-generation larvae also hibernate. The adults emerge in May, July and September, and the females lay their eggs on the plants close to the base. The larvae tunnel in the lower stems, roots and root-collars and pupate either in their tunnels or in the soil. All these generations develop in cultivated carrot, and the first, which attacks second-year plants, in wild carrot also. The larvae are parasitised by an unidentified Ichneumonid. Various scavengers develop in the tunnels.

Phytoecia has one generation a year and infests cultivated and wild carrot. The adults emerge at the end of May and the females deposit their eggs in incisions at the base of the stems or in the root-collars of carrots, and the larvae tunnel down to the bottom of the roots, returning to the upper parts to pupate. Pupation occurs in the tunnels in late August, and the pupae overwinter. The larvae are parasitised by the Ichneumonid, *Phaenolobus saltans* (Grav.), which pupates at the end of July in the tunnel of its host and gives rise to adults in early May.

Costantino (G.). **I prodotti a base di Gammesano (Tiogamma e Toxin C) nella lotta contro le cavallette.** [Benzene-hexachloride Products (Tiogamma and Toxin C) for the Control of Locusts.]—*Circ. Osserv. reg. Fitopat. Calabria* no. 4, 7 pp., 5 refs. Catanzaro, 1948.

BHC (benzene hexachloride) was tested against *Calliptamus italicus* (L.) and *Locusta migratoria* (L.) in the Province of Catanzaro, southern Italy, in the autumn of 1946 in the form of Tiogamma containing 20 per cent. BHC and 3 per cent. thiocyanates and Toxin C containing 20 per cent. BHC. Baits of bran mixed with 2 per cent. of these powders and moistened with water were first tried and gave good results, though it proved difficult to cover all the flakes of bran with Tiogamma, so that mortality was uneven. In view of this and the scarcity of water in the infested areas, a dust of 4 per cent. Tiogamma in talc was compared with the Tiogamma bait and proved much superior. Promising results were also given in preliminary tests when sieved earth was substituted for talc. Directions for preparing and applying baits and dusts of the two products are given.

Jahn (E.). **Das Massenauftreten des grauen Lärchenwicklers** *Grapholitha (Semasia) diniana* **in Österreich in den Jahren 1946 und 1947.** [The Mass Occurrence of *Enarmonia diniana* in Austria in the Years 1946 and 1947.] —*Anz. Schädlingsk.* **21** pt. 4 pp. 49–51, 2 refs. Berlin, 1948.

The outbreak of *Enarmonia* (*Grapholita*) *diniana* (Gn.) that occurred on larch in Austria in 1946 and 1947 progressed from west to east and spread gradually from the north and east of the Tyrol to western Carinthia [*cf. R.A.E.*, A **38** 50]. The infestation in 1946 occurred at altitudes ranging from about 3,000 to over 6,500 ft., but was most severe above about 4,250 ft. In 1947, however, trees were infested down to about 2,000 ft. and the lower limit of intense feeding was about 3,300 ft. Moreover, all sites were infested, whereas in 1946 stands situated on northern slopes were preferred. Infestation was most severe in stands in which larch occurred alone or predominated, and, in the Tyrol, on trees 100–250 years old. The loss of needles varied from 20 to 100 per cent., with an average of about 50–70 per cent. Feeding occurred chiefly in the upper part of the crown, but spread to the whole of it when infestation became intense.

In 1947, the period of larval infestation lasted from the beginning of May till mid-July, development becoming later with increasing altitude. Owing to the unusually warm and dry season, the larval and pupal stages lasted only 3–5 and 1–2 weeks, respectively. Frequently, the larvae did not descend from the trees to pupate, but pupated at the site of the feeding. About 50 per cent. of the population was parasitised in the north Tyrol, probably because the outbreak there was in its second year, whereas parasitism was negligible in east Tyrol and Carinthia, where it was in its first year.

Other pests that attacked larches locally were *Coleophora laricella* (Hb.), which was commonest on diseased or damaged trees, and *Pristiphora* (*Lygaeonematus*) *laricis* (Htg.).

Thiem (H.). **Zur Weiterentwicklung der praktischen Maikäfer- und Engerlingsbekämpfung.** [Further Developments in practical Control of Cockchafers and their Larvae.]—*Anz. Schädlingsk.* **21** pt. 4 pp. 51–55, 1 ref. Berlin, 1948.

To supplement laboratory experiments in Germany on the control of adults of *Melolontha* [*cf. R.A.E.*, A **38** 345], the proprietary preparations E 605 [containing parathion], Gesarol and Gesapon [containing DDT], and Nexit, Nexen and Viton [all containing BHC (benzene hexachloride)] were tested against larvae in the third instar. The effectiveness of most of the materials was first tried against adults of the granary weevil [*Calandra granaria* (L.)] and larvae of the flour beetle [*Tenebrio molitor* L.], against which the best results were given by parathion applied as a dust or a liquid (E 605a and E 605f, respectively). In the tests against *Melolontha*, the larvae were first introduced into pots containing compost mixed with various amounts of the parathion or BHC products or Gesarol as powders or liquids. Parathion rapidly killed all the larvae in freshly treated soil, Nexen in water also did so at the highest concentration tested, and most treatments had done so after five weeks, but none gave any mortality in ten days when the larvae were introduced 38 days after the soil had been treated, though the results were again usually good in 27 days. When liquids were applied to the soil of pots each containing a young lettuce plant and two larvae and the soil was then copiously watered, parathion killed the larvae in two days, Nexen protected the plants in so far as the larvae did not feed, and Gesapon caused them to abandon the pots. In no case were the plants adversely affected by the treatment. When the potted plants were immersed in the liquids and then watered, parathion and Nexen prevented the larvae from feeding, with the exception of one test with parathion, but Gesapon afforded no protection. In field tests, parathion as E 605f gave good mortality of larvae in a meadow and a field of fodder beet, and it appeared more advantageous to use a higher concentration at a moderate rate of application than a lower concentration at a higher rate. Dusts of parathion or BHC gave poor results, probably owing to the dry weather.

EICHLER (W.). **Auffällige Schädlingsvorkommen in Mitteldeutschland (1947).** [Prominent Pests in central Germany in 1947.]—*Anz. Schädlingsk.* **21** pt. 4 pp. 55–58, 3 figs. Berlin, 1948.

In the summer of 1947, which was unusually hot and dry, the insects that caused most damage to cultivated crops in the Province of Saxe-Anhalt included *Haplothrips tritici* Kurdj. on wheat, *Pieris brassicae* (L.) and *Athalia rosae* (L.) (*colibri* (Christ)) on crucifers, *Hylemyia antiqua* (Mg.) on onions, which were quite destroyed in some localities, *Cydia* (*Grapholita*) *nigricana* (Steph.) on peas, *Psylliodes affinis* (Payk.) on potatoes, and *Bruchus rufimanus* Boh. on broad beans. *Rhopalosiphoninus* (*Myzodes*) *latysiphon* (Davidson) was abundant on the shoots of stored potatoes [*cf. R.A.E.*, A **37** 64].

BRANDT (H.). **Der Rapsglanzkäfer als Bohnenschädling.** [The Rape Beetle as a Pest of Beans.]—*Anz. Schädlingsk.* **21** pt. 4 pp. 58–59. Berlin, 1948.

Overwintered and newly emerged adults of *Meligethes aeneus* (F.) are known to feed in the flowers of various plants in spring and summer, respectively [*cf. R.A.E.*, A **31** 36], but few such plants other than crucifers have been recorded. The beetles have been reported feeding on *Lupinus luteus* and *Trifolium agrarium*, and instances of heavy feeding on cherry flowers have occurred [**12** 439 ; **31** 380]. In June and July 1947, the flowers of bush and pole varieties of beans (*Phaseolus vulgaris*) near Munich were heavily infested by the beetles, three or more of which occurred in each, feeding on the pollen and stamens. The infested flowers dropped when the plants were jarred, and the damage caused amounted to 50–60 per cent. loss of yield. The fact that the plants concerned had been well watered indicated that the shedding of the blossoms was not due to the prevailing drought.

SCHWERDTFEGER (F.). **Die Ursachen von Borkenkäfer-Epidemien in Fichtenwäldern.** [The Causes of Bark-beetle Outbreaks in Spruce Forests.]—*Z. Weltforstw.* **12** pt. 4–6 pp. 57–61, 9 refs. Hamburg, 1948. (With Summaries in English and French.)

This is a detailed discussion, based on observations in the Hartz district, of the factors considered by the author to be responsible for outbreaks of *Ips typographus* (L.) on spruce ; they have already been noticed from a briefer account [*R.A.E.*, A **38** 93].

SCHIMITSCHEK (E.). **Berücksichtigung des Reifungsfrasses bei der Bekämpfung des achtzähnigen Fichtenborkenkäfers** (*Ips typographus* **L.**). [Consideration of the Maturation Feeding of *I. typographus* in Connection with Control.]—*Pflanzenschutzberichte* **2** pt. 9–10 pp. 129–139, 5 figs., 5 refs. Vienna, 1948.

It is frequently observed that overwintered adults of *Ips typographus* (L.) congregate in spring for maturation feeding at sites other than those in which they have developed or in which they later reproduce [*cf.* *R.A.E.*, A **38** 164, 175, 467], and in this paper the author discusses from experience gained during the outbreak of this bark-beetle on spruce in lower Austria in 1947 and 1948 the causes of this phenomenon and the use that can be made of it for control. It occurs as a result of overcrowding at the cambial zone of trees in which the beetles have developed, so that sufficient food is not available, and of overwintering in the soil [*cf.* **38** 163, 466]. The beetle overwinters in the soil only in years in which development is accelerated by favourable weather, so that newly emerged or sexually immature adults are present in autumn ; these enter the soil when suitable sites are not available on the trees owing to the size of the population, when they are disturbed by control operations which are sometimes carried out incompletely so that infested bark is left, and when bark falls naturally from the trees.

Maturation feeding of this sort occurred in both years in Lower Austria. It began in late March or April, when the temperature reached 20°C. [68°F.], and lasted 8–14 days, so that it was completed for the whole population in three weeks. A single entrance was used by many beetles, and feeding galleries radiated from it in all directions. The feeding occurred chiefly in trap-logs, stumps and standing trees [*cf.* **38** 175] and in 1948 also in piled logs and firewood that had not been barked. In the piled wood, the beetles were found in the upper but not the top layers, and this seemed to be due to microclimatic preferences. The numbers of beetles at single sites were frequently very great, and heaps of frass 4 ins. high were observed at the foot of certain affected trees.

This congregation of the young beetles for feeding provides a good opportunity for control. In the spring of 1947, large numbers were destroyed by felling standing spruces on which the beetles had gathered, barking them and infested trap-logs on sheets, and immediately burning the bark. In 1948, sprays of parathion (E 605f) and DDT (Gesarol) were tested on piled wood, which was treated in layers so that all surfaces were covered. Parathion killed all the beetles hit by the spray in eight hours and all those within about 1 cm. of the surface of the wood in two days, while DDT also gave high mortality but was slower in action. Infested stumps were also sprayed, and the effectiveness of the treatments was confirmed by the fact that trap-logs laid out in the treated area became only moderately infested, whereas those some 500 yards away were heavily attacked. A programme of control measures applicable when hibernation occurs chiefly in the adult stage is outlined.

CROOKE (M.). *Pissodes validirostris* **Gyll., in Shoots of** *Pinus sylvestris* **L.**—*Forestry* **21** no. 2 pp. 221–226, 2 pls., 11 refs. London, 1948.

Weevil larvae found boring in the shoots of Scots pine (*Pinus sylvestris*) in a plantation eight years old in Angus, Scotland, in May 1947 gave rise to adults that were identified as *Pissodes validirostris* (Sahlb.). This species usually infests the cones, and has not previously been recorded from the shoots; it has only once been observed in Britain, W. B. R. Laidlaw having reared a single adult, together with the Braconid parasite, *Brachistes* (*Calyptus*) *mucronatus* (Thoms.) from cones of Scots pine from Morayshire [*R.A.E.*, A **19** 560; **21** 639]. The adults are described, and the habits of other weevils of the genus reviewed. Of 99 infested shoots examined, all but four were leading shoots, and each contained 1–7 larvae, most of which were in the basal portions. Nearly all the shoots had lost a high proportion of their needles and had turned brown, but those that contained only 1–2 larvae showed no sign of damage above the infested region, though it was unlikely that they would have survived. The larvae had pupated by 9th June and most of the adults were formed by 8th July, though they did not leave the shoots until late July or early August; only 13 were obtained. Six adults of *Ephialtes sagax* var. *laticeps* (Ratz.) emerged between 12th and 22nd May from seven shoots containing 24 larvae collected early in the month, and parasitism by this Ichneumonid is thought to have been partly responsible for the small number of adults that emerged, another factor being the high humidity of the rearing cages. One female of *B. mucronatus* emerged on 12th June. Laidlaw informed the author that he had recently reared *E. s. laticeps* from cones of *Pinus contorta* in Morayshire believed to be infested by *Pissodes validirostris*.

Damage by the weevil is not considered serious, though its increase in shoots would result in its becoming an economic pest of Scots pine. The plantation was kept under observation and a subsequent smaller attack was reported, though the amount of damage had not been estimated. The only method of control is the destruction of infested shoots, but this should not be done until mid-June, to permit the emergence of parasites.

THREIPLAND (P. W. M.). **Notes on an Attack by Pine Weevil** (*Hylobius abietis*) **on a Plantation of Scots Pine and Japanese Larch.**—*Quart. J. For.* **42** no. 2 pp. 109–111. London, 1948.

Spruce and hardwoods over an area of about 13 acres in South Wales were felled during 1942–44; about 5½ acres were planted with hardwoods and some Scots pine [*Pinus sylvestris*] and larch [*Larix*] in 1943 and the rest was planted, mainly with Scots pine and Japanese larch [*Larix kaempferi*], in 1945–46. Between August and early October 1946, a serious outbreak of *Hylobius abietis* (L.) occurred in the latter area and destroyed about a third of the trees. A further attack was observed in May 1947, when every tree appeared to be infested. Hand-collection of the weevils was at once carried out, and no further appreciable damage occurred that year. In small field experiments, spraying or dusting with DDT showed no promise, and in laboratory tests in which the weevils were exposed to DDT in various ways, only a heavy, direct application to the insects of a spray containing 5 per cent. DDT was effective. Traps containing coffee, beer, cheese or pine essence as a bait did not attract the weevils.

Scots pine was more heavily damaged than larch, possibly because the trees were smaller. Hardwoods were not damaged, though a few weevils were found on beech and two were observed gnawing a cut hazel stick. The infestation presumably originated in stumps of spruce left in the plantation during felling.

Mushroom Growing.—*Bull. Minist. Agric.* no. 34, 5th edn., iv+68 pp., 22 pls., 1 fig., many refs. London, H.M.S.O., 1950. Price 3*s.* 6*d.*

This bulletin on the cultivation of mushrooms in Britain includes a section (pp. 39–52) in which general information is given on the appearance, bionomics, and control of the pests, mostly insects and mites, that attack this crop.

JOLLY (G. M.). **The Use of Probits in combining Percentage Kills.**—*Ann. appl. Biol.* **37** no. 4 pp. 597–606, 1 fig., 6 refs. London, 1950.

The following is the author's summary. The problem is discussed of how to combine percentage kills obtained in an experiment repeated under different sets of conditions. Treatment effects and their interaction with replicates are defined in terms of probits, and, assuming the absence of such interaction, a method is evolved of finding maximum likelihood estimates of the mean treatment differences. An example is used to illustrate details of the method. The merits of the logit and angular transformations applied to the same type are also discussed.

ASHBY (D. G.). **The phytotoxic Effects of D.D.T., B.H.C., Parathion and Toxaphene on Tobacco.**—*Ann. appl. Biol.* **37** no. 4 pp. 624–639, 11 figs., 8 refs. London, 1950.

The following is virtually the author's summary of experiments in Southern Rhodesia. No phytotoxic effect was seen after application of technical DDT as a suspension spray to tobacco seed-beds before sowing or as a dust to three-week-old tobacco seedlings at rates of 27 and 75·6 lb. DDT per acre, respectively. A pre-sowing application of parathion (2 per cent. dust) at 1·8 lb. parathion per acre also had no harmful effect. Used on three-week-old tobacco seedlings at the excessive rate of 22·7 lb. per acre it caused serious stunting and many deaths. Toxaphene, applied as a 25 per cent. wettable powder in a pre-sowing spray at 6·4 lb. toxaphene per acre, did not injure tobacco seedlings. No residual phytotoxic effects appeared in beds resown four months after being treated with parathion or toxaphene at the pre-sowing doses given above.

BHC (technical benzene hexachloride), applied as a spray before sowing at doses above 1·6 lb. BHC per acre, suppressed root development in newly germinated tobacco seedlings. BHC dusts used on 11-day-old seedlings at 2·25 lb. BHC per acre caused temporary distortion and stunting. At rates of up to 11 lb. per acre, these symptoms were transitory : at 37·5 lb. per acre many plants were killed and the remainder severely stunted. Resistance to these phytotoxic effects increased with age of plant, but three-week-old tobacco seedlings showed considerable mortality after the application of 75·6 lb. BHC per acre. Beds re-sown four months after the application of 6·4 and 12·8 lb. BHC per acre, showed no phytotoxic effect, but, as tobacco seed is sown on the soil surface, the effect of the BHC may have been merely masked, and it is not safe to assume that there was no residual effect. The actual persistence of BHC in the soil was not determined.

The possible mechanism of the action of BHC on the seedlings is discussed.

KENNEDY (J. S.), IBBOTSON (A.) & BOOTH (C. O.). **The Distribution of Aphid Infestation in Relation to Leaf Age. I.** *Myzus persicae* **(Sulz.) and** *Aphis fabae* **Scop. on Spindle Trees and Sugar-beet Plants.**—*Ann. appl. Biol.* **37** no. 4 pp. 651–679, 15 figs., 3 refs. London, 1950.

IBBOTSON (A.) & KENNEDY (J. S.). **II. The Progress of** *Aphis fabae* **Scop. Infestations on Sugar Beet in Pots.**—*T. c.* pp. 680–696, 7 figs., 3 refs.

The following is almost entirely from the authors' summary of the first paper. The leaf-by-leaf distributions of free infestations of viviparae of *Myzus persicae*

(Sulz.) and *Aphis fabae* Scop. were recorded on sugar-beet plants and spindle bushes (*Euonymus europaeus*) in pots in the greenhouse, and the distributions of the various seasonal forms of *A. fabae* were recorded on the same plants growing naturally out of doors in Cambridgeshire. The Aphid distributions were related to the ages of the leaves estimated on an arbitrary scale of ten types of leaf distinguished by degree of unfurling and colour. The diverse types of distribution recorded were all reducible to a common general pattern : growing and senescing leaves were more susceptible to colonisation than maturing, mature and dying leaves. The resultant occurrence of a two-peaked curve within Aphid densities on a series of leaves at successive stages of development was found in its entirety on certain sugar-beet plants, but only part of the complete curve was usually represented, owing to the incomplete range of leaf ages present on any one plant, particularly on the spindle tree.

Fundatrigeniae of *A. fabae* were found colonising sugar-beet at the foot of spindle trees, and spring and summer migrants were found starting colonies on spindle. The normal association of each seasonal form of the Aphid either with the " primary " winter food-plant, or with a " secondary " summer one, but not with both, is therefore not obligatory. It is attributed to the normal inaccessibility of summer food-plants to fundatrigeniae and the normal unsuitability of the winter food-plant when the alienicolae are migrating and its leaves are mature.

When *M. persicae* and *A. fabae* were infesting the same plant at the same time, their distributions were broadly alike, but *M. persicae* extended on to both younger and older leaves than did *A. fabae* and more strictly avoided the more mature leaves. This difference was most marked on spindle, an unusual food-plant for *M. persicae*. Hence it is suggested that the degree of adaptation of a given Aphid to a given plant may be gauged by the extent to which the Aphid can colonise its leaves, not only when they are growing and senescing, but also when they are mature and fully functional.

The following is the authors' summary of the second paper. Infestations of apterous *Aphis fabae* Scop. on potted sugar-beets have been followed in detail for several weeks. The plants were somewhat stunted and their crowns presented an unusually complete series of leaf ages. Records were kept of the changing number and size of the leaves and of their stage of growth. Parallel records were kept of the changing population of Aphids on every leaf, and the figures are analysed in various ways to show how suitability for the Aphids varied through the life-cycle of the leaves. The leaves were very suitable when young, became unsuitable as they matured, became suitable again just after maturity and then unsuitable again as they senesced. But among leaves at any given stage, those which were growing or senescing rapidly were more suitable than those changing slowly, unless the rate of senescence was very high. The differences of population density on different-aged leaves were due largely to the preferences exercised by the apterous adults. The added effect of differences in the fecundity of these mothers while feeding on different leaves was not excluded, but could not be assessed. It is concluded that the physiological development of the plant as a whole determines, through the growth and senescence among its total complement of leaves, the progress and pattern of its Aphid infestation.

WOODROFFE (G. E.). **A Life-history Study of the Brown House Moth,** *Hofmannophila pseudospretella* **(Staint.) (Lep., Oecophoridae).**—*Bull. ent. Res.* **41** pt. 3 pp. 529–553, 3 pls., 5 figs., 28 refs. London, 1951.

The following is substantially the author's summary of this account of laboratory investigations on *Hofmannophila pseudospretella* (Staint.), which is widely distributed in Britain as a minor pest of stored foodstuffs, clothes and furnishings and may under certain conditions give rise to a major infestation. The egg stage is characterised by a high sensitivity to temperature and almost complete indifference to humidity. The incubation period varied from 110 days at 10°C. [50°F.] to 8·5 days at 27°C. [80·6°F.] when the relative humidity was 90 per cent. and from 9·8 days at 90 per cent. humidity to 14 days at 8·5 per cent. when the temperature was 25°C. [77°F.]. The percentage survival was greatly reduced at relative humidities of 100 per cent. and below 3 per cent. The survival of eggs from a single female varied from 56 to 97 per cent. under favourable conditions.

The duration of the feeding larval stage varied between 145 days at 13°C. [55·4°F.] and 71 days at 25°C. at a humidity of 90 per cent. when a diet of middlings was provided. Larvae failed to mature at humidities lower than 80 per cent. at all temperatures. They were reared successfully on a wide range of diets of both animal and vegetable origin, some predominantly carbohydrate, some almost entirely protein. The most rapid development occurred on dead adults and the slowest on a mixture of shredded leather and yeast. Under most conditions, fully grown larvae entered diapause. This was characterised by a diapause moult ; after it, the larvae assumed a typical diapause appearance, which is described. The length of the diapause was extremely variable and was determined largely by the temperature during larval growth. Larvae that had developed at low temperature did not enter diapause when incubated at 25°C. as fully grown larvae. The diapausing larvae were remarkably resistant to desiccation. The duration of the pupal stage is affected by temperature but not by humidity. It lasted 98 days at 10°C. and 13 days at 28°C. [82·4°F.]. The total length of the developmental period was highly variable because of the variability in the length of the diapause under constant conditions. At a constant temperature of 25°C. and relative humidity of 90 per cent., the total developmental period varied between 152 and 266 days, and at 20°C. [68°F.] and the same relative humidity the figures were 192 to 440 days. The developmental period was approximately 12 months under field conditions.

Under crowded conditions, mating was observed between males of *H. pseudospretella* and females of *Endrosis lactella* (Schiff.) but none of the eggs developed.

The weight of the female at emergence was the most important factor governing the number of eggs laid. Weight of females varied between 8·2 and 43·6 mg. and the egg number between 106 and 657 at 25°C. and 70 per cent. humidity. The number laid was significantly reduced at lower temperatures (10°C.) and at lower humidities (20 per cent.). The sex ratio was found to be approximately 1 : 1, with a slight predominance of females. The length of life of the fertilised adult female depended upon its weight at emergence and upon the physical conditions. The mean survival periods of mated females of all weights were 11·9 days at 25°C. and 70 per cent. humidity, 19 days at 15°C. [59°F.] and 70 per cent., and 9·4 days at 25°C. and 20 per cent. Mated males lived for averages of 7·1 days at 25°C. and 18·8 days at 15°C. The only important predator was the mite, *Cheyletus eruditus* (Schr.), which destroyed numbers of eggs and young larvae.

EDWARDS (E. E.) & BEVAN (W. J.). **On the Narcissus Flies,** *Merodon equestris* **(F.) and** *Eumerus tuberculatus* **(Rond.) and their Control.**—*Bull. ent. Res.* **41** pt. 3 pp. 593–598, 9 refs. London, 1951.

None of the measures hitherto recommended for the control of *Merodon equestris* (F.) and *Eumerus tuberculatus* (Rond.) on *Narcissus* bulbs [*R.A.E.*, A **11** 52 ; **21** 366, etc.], which are reviewed, has proved entirely satisfactory in Britain, and laboratory and field experiments were carried out in 1945–47 to examine the value of insecticides for application in the field. In the laboratory tests, adults of both species confined for one minute with treated filter paper were killed in ten hours by a dust of 5 per cent. DDT or a suspension containing 0·5 per cent. DDT and in five hours by a suspension containing 0·2 per cent. BHC (benzene hexachloride). In similar experiments with the larvae, in which a suspension of 0·5 per cent. BHC was also included, no lethal effects were produced, even after contact with BHC for 20 hours, but when the larvae were sprayed, BHC at both concentrations gave about 25 per cent. mortality within 24 hours, though DDT at 0·1 and 0·5 per cent. was ineffective. In the field experiments, which were made in South Wales in 1946 and 1947, suspension sprays of DDT and BHC at 0·5 per cent. were applied at 1 gal. per 16 yards of row to the aerial parts of the plants and the surrounding soil on 10th–11th May, 7th June and 13th July, and a dust of 4 per cent. mercurous chloride (calomel) was applied at 1 lb. per 40 yards on the same dates and also on 26th June and 21st–24th July. Adults of both species appeared in each year on the day after the first application. The percentages of bulbs infested by *Merodon* and (in brackets) *Eumerus* averaged 6·04 (0·25) for DDT, 2·05 (0·36) for BHC, 9·58 (4·27) for calomel and 27·69 (5·49) for no treatment. It is concluded that BHC and, to a less extent, DDT, provide a considerably more effective and practicable method of control of these flies than those hitherto available.

SABROSKY (C. W.). **Two new Species of** *Pseudiastata* **(Dipt., Drosophilidae) predacious on the Pineapple Mealybug.**—*Bull. ent. Res.* **41** pt. 3 pp. 623–627, 8 figs., 9 refs. London, 1951.

In this revision of the species of *Pseudiastata*, the author describes the genus, the male terminalia of *P. nebulosa* Coq., *P. pseudococcivora*, sp. n., *P. vorax*, sp. n., and a single male from Brazil that is closely allied to *P. vorax* but may represent a distinct species, and the wing of *P. brasiliensis* Costa Lima [*cf. R.A.E.*, A **26** 319 ; **27** 23], which differs from those of the others. *P. pseudococcivora* is described from adults reared from larvae predacious on *Pseudococcus brevipes* (Ckll.) in the Panama Canal Zone and a male from Mexico intercepted in Texas. It is undoubtedly the predator of *P. brevipes* recorded as *Pseudiastata nebulosa* that was introduced into Hawaii in 1924–32 [**21** 275] and may be the one recorded under the same name from Guatemala [**24** 177]. The true *P. nebulosa* has not been found outside the United States and its larval habits are unknown. *P. vorax* is predacious on *Pseudococcus brevipes* on cacao in Trinidad.

WILLIAMS (J. R.). **The Bionomics and Morphology of** *Brenthia leptocosma* **Meyrick (Lep., Glyphipterygidae).**—*Bull. ent. Res.* **41** pt. 3 pp. 629–635, 13 figs., 6 refs. London, 1951.

An account is given of the bionomics of *Brenthia leptocosma* Meyr., and its immature stages are described. It is known only from Mauritius, where it is abundant and widely distributed, but it is unlikely to be indigenous as its only known food-plants are species of *Cordia*, all of which are introduced. It is known to feed on four of the five species of this genus present in Mauritius, and prefers *C. macrostachya*, which is a noxious weed there. It is the only member of the established fauna that causes appreciable damage to this plant [*cf. R.A.E.*, A **35** 2], but is of no value in its control as it prefers vigorous plants, which are most able to withstand damage, it seldom attacks young leaves, and an individual larva destroys only part of a single leaf. A list of parasites recorded from it for the first time is included.

CAMERON (E.). **The Biology and economic Importance of** *Alomya debellator* **(F.), a remarkable Parasite of the Swift Moth,** *Hepialus lupulinus* **(L.).**—*Bull. ent. Res.* **41** pt. 2 pp. 429–438, 5 figs., 10 refs. London, 1950. **On the Identity of an Ichneumonid Parasite of** *Hepialus lupulinus* **(L.).**—*Op. cit.* pt. 3 p. 637, 3 refs. 1951.

The main paper contains a brief section on the systematic position of the genus *Alomya* and an account of the results of observations in England on a parasite of *Hepialus lupulinus* (L.) that was thought to be *A. debellator* (F.), but is stated in the supplementary note to be *Ichneumon suspiciosus* Wesm. ; detailed descriptions of the morphology and anatomy of the first-instar larva and briefer descriptions of the mature larva, prepupa and pupa are included. It is the parasite that has been shipped to Australia with a view to its use against Hepialids of the genus *Oncopera*, and has been referred to as *A. debellator* in Australian reports [*R.A.E.*, A **32** 140 ; **33** 322].

The larvae of *H. lupulinus* attack wheat, grass, potatoes, parsnips, carrots, lettuce, strawberry, ornamental plants and weeds. Most of the parasitised hosts were collected from large tracts of land under scabious and pyrethrum in Cambridgeshire. *I. suspiciosus* is the chief parasite of *H. lupulinus* in southern England, where it causes about 10–17 per cent. mortality. Its distribution appears to be fairly local. The adults emerge from the host pupae in June, the maximum emergence of males and females taking place in the second and third weeks, respectively. Under favourable conditions, they lived for several months in the laboratory, mating shortly after emergence. There are at least four, and possibly five, larval instars. First-instar larvae were found in some host larvae from early spring to early June ; it is stated in the supplementary note that their presence is evidently due to spring oviposition, since many Ichneumonids overwinter as mated females and adults of *I. suspiciosus* have been recorded overwintering under bark and in tufts of the grass, *Deschampsia caespitosa*. Mature parasite larvae were present towards the end of May, prepupae at the beginning of June, and pupae during most of June. Pupation takes place in a silken cocoon within the host pupa, and the pupal stage lasts at least 11 days.

The attempt to introduce this parasite into Australia was made owing to the difficulty and costliness of controlling Hepialids effectively by chemical means. Parasitised host pupae for shipment were packed in wood wool in a small metal box pierced with holes through which the adult parasites could emerge during the voyage, and this was fixed to the floor of a much larger wooden container in which was a supply of raisins as food for them. Living adults arrived in Australia in a vigorous condition.

MAYNÉ (R.). **Les insectes et acariens des matières alimentaires.**—*Bull. Ann. Soc. ent. Belg.* **84** no. 3–4 pp. 100–104, 1 ref. Brussels, 1948.

Studies were begun in 1947 on the pests infesting stored products in Belgium, in the course of which many samples were examined. This paper contains records of the 15 Bruchids found during the work. Of those already known to be present *Bruchus pisorum* (L.) occurred in peas, *B. obtectus* Say (*Acanthoscelides obsoletus* auct.) in beans, *B. atomarius* (L.) and *B. rufipes* Hbst. in vetches and *B. rufimanus* Boh. in vetches and broad beans. The others, which are recorded from Belgium for the first time, were *B. signaticornis* Gylh. in lentils from France ; *B. lentis* Froel. and *B. ervi* Froel. in lentils from Turkey, and *B. ervi* in lentils of unstated origin ; *B. tristis* Boh. and *B. quinqueguttatus* Ol. in vetches from Syria, and the former also in broad beans ; *B.* (*Callosobruchus*) *maculatus* F. in seeds of *Voandzeia subterranea*, some of them known to be from the Belgian Congo, and peas from Turkey ; *B. tristiculus* Fhs. and *B. rufimanus* var. *velutinus* Muls. & Rey in seeds of *V. subterranea* ; *B.* (*Callosobruchus*) *chinensis* L. in broad beans from Australia ; and *Spermophagus subfasciatus* Boh. in beans. Infestation by *B. lentis*, *B. chinensis* and *B. maculatus* was heavy.

It is also stated that *Rhizopertha dominica* (F.), which was hitherto believed to be rare in Belgium, was frequently found in large numbers in the wooden ducts of flour mills.

WEBB (J. E.). **The Structure of the Cuticle in** *Eomenacanthus stramineus* **(Nitzsch), (Mallophaga).**—*Parasitology* **38** no. 1–2 pp. 70–71, 1 pl., 2 refs. Cambridge, 1947.

The epicuticle of *Eomenacanthus stramineus* (Nitzsch) is shown to consist of separate layers penetrated by pore canals, as demonstrated by Wigglesworth for *Rhodnius* [*R.A.E.*, A **37** 110].

JANNONE (G.). **Migrazioni periodiche di Lepidotteri in Eritrea e loro riflessi sull'agricoltura (seconda nota).** [Periodic Migrations of Lepidoptera in Eritrea and their Effects on Agriculture (second Note).]—*Ann. Mus. Stor. nat. Genova* **63** pp. 142–167, 1 fig., 13 refs. Genoa, 1948.

Further to his paper published in 1945 [*R.A.E.*, A **36** 382], the author discusses the phenomenon of migration in insects and the terminology to be used in connection with it, the migration of butterflies across Eritrea, and observations in 1945 already noticed from an account published in 1946 [**36** 382] of damage to artichoke [*Cynara scolymus*] there by *Vanessa* (*Pyrameis*) *cardui* (L.). The west-east migration of butterflies occurs in September–November and the return migration, which is frequently much less extensive, in April–May. Of the species involved, the most injurious other than *V. cardui* is *Pieris brassicoides* Guér., which injures cabbage crops and ornamental crucifers.

OMAN (P. W.). **Notes on the Beet Leafhopper,** *Circulifer tenellus* **(Baker), and its Relatives (Homoptera : Cicadellidae).**—*J. Kans. ent. Soc.* **21** no. 1 pp. 10–14, 1 fig., 3 refs. Manhattan, Kans., 1948.

The author defines the genus *Circulifer*, outlines its distribution in Europe, North Africa and Asia and concludes that the beet leafhopper, *Eutettix* (*Thamnotettix*) *tenellus* (Baker), is referable to it. *C. tenellus* is the only Nearctic member of the genus, and material from the Old World was studied with the object of ascertaining its relationships and distribution. The fact that *T. indivisus* Haupt, which was described from Palestine, is synonymous with *C. tenellus* [*R.A.E.*, A **25** 169] is confirmed, and a syntype of *T. ignavus* Mats., which was described from Sicily, is also found to be identical with it. *Circulifer* (*Cicadula*) *nausharensis* (Pruthi), which was described from the Punjab, and *C.* (*Thamnotettix*) *dubiosus* (Mats.), which was described from Sicily and Spanish Morocco, are distinct. A check list of the species of *Circulifer* showing their synonymy is appended.

STARR (D. F.), FERGUSON (P.) & SALMON (T. N.). **Toxicity of a synthetic Pyrethrin.**—*Soap & sanit. Chem.* **26** no. 3 pp. 139, 141, 143, 4 refs. New York, N.Y., 1950.

The following is based on the authors' summary. The results are given of tests to determine the toxicity to warm-blooded animals of the completely synthetic allyl homologue of cinerin I, which is here referred to as devinylpyrethrin I (DVPy I) [and is also known as allethrin (*cf. R.A.E.*, A **38** 505)]. Neither rats receiving 0·2 per cent. of the ester in their diet nor their offspring showed any evidence of being harmed over a period of 24 weeks, and they were of approximately the same size as untreated animals at the end of that time. Inhalation of and contact with a 1 per cent. aerosol spray in large amounts did no apparent damage to rats exposed to it for 30 minutes a day on six days weekly for 22 weeks, and the rate of growth of new-born rats that were subjected to this treatment was the same as that of untreated ones. In all, 112 rats were fed on or sprayed with the compound.

Examination of the internal organs of treated rats showed no gross pathology, and microscopic examination of the organs showed no abnormalities that could be correlated with treatment.

ZIMMERMAN (P. W.) & HARTZELL (A.). **Hexaethyl Tetraphosphate and Tetraethyl Pyrophosphate : I. Their Effects on Plants. II. Their Toxicities to Insects and Mites.**—*Contr. Boyce Thompson Inst.* **15** no. 1 pp. 11–19, 1 fig., 4 refs. Menasha, Wis., 1947.

Laboratory tests were carried out in the United States to determine the toxicity to plants of HETP (hexaethyl tetraphosphate) and TEPP (tetraethyl pyrophosphate), which has been shown to be the insecticidally active component of it [*cf. R.A.E.*, A **38** 155, etc.]. The vapour produced by heating either material caused severe injury to the leaves of tomato plants exposed immediately and epinastic responses in those exposed later, the epinasty being less pronounced following exposure to TEPP. Leaves of roses were also injured and the petioles curled downward. Ethylene is known to induce epinastic responses in rose, and since it has been reported that this gas is evolved during the decomposition of HETP by heat (135°C. or more), it was probably responsible for the epinasty observed in the present experiments. The vapour of HMTP (hexamethyl tetraphosphate) did not injure the leaves or cause epinasty.

Solutions containing 15 ml. HETP in 400 ml. water, 18 ml. TEPP in 85 ml. water or 10 ml. TEPP, 10 ml. Vapotone (50 per cent. HETP) and 10 ml. sesame oil in 400 ml. water were dispersed in a greenhouse from a diffuser that emits a spray mist with particles larger than those of an aerosol but able to float to all parts of the house and remain in the air for over an hour. The greenhouse contained a large variety of plants, mostly ornamentals, but including strawberry and tomato, and none of them showed any epinasty of the leaves. Tomato, and, to a less extent, strawberry and chrysanthemum were injured, especially when in direct line with the dispenser, but eventually recovered. TEPP applied in the same manner at a concentration of 30 ml. in 70 ml. water in a greenhouse with a capacity of 4,250 cu. ft. in which 75 ml. solution was liberated also caused no epinasty, but damaged rather more than half the number of plant species present, though all recovered except tomato and *Kalanchoe daigremontiana* in direct line with the spray.

In experiments in which water solutions containing 50 mg. TEPP or more in 50 ml. water were applied to the soil of 4-inch pots at 50 ml. per pot, tomato plants growing in the pots were severely injured or killed, and 25 mg. per 50 ml. caused temporary epinasty of the leaves. HETP applied in a similar manner killed the plants at concentrations of 250–500 mg. per 50 ml. and caused temporary epinasty of the leaves at 25–100 mg.

In tests of toxicity to arthropods, detached leaves infested by *Tetranychus bimaculatus* Harvey or *Aphis fabae* Scop. (*rumicis* auct.) were sprayed with HETP at dilutions of 1 in 1,600 and 1 in 6,000. The higher concentration gave

97 and 95 per cent. mortality, respectively, and the lower one 78 and 88. HMTP at 1 in 2,000 gave complete mortality of *T. bimaculatus* on detached leaves. Diffusion in the greenhouse of HETP and the solutions of TEPP alone or in combination that were tested for plant injury gave 93–100 per cent. mortality of adults and nymphs of *T. bimaculatus* on plants in the house, but did not kill the eggs. Adults of *Pseudococcus citri* (Risso) were more resistant than the nymphs, and the degree of control of this mealybug depended on the relative numbers of each present. The mixture of Vapotone, TEPP, and sesame oil was the most effective, and gave 90 per cent. mortality of the nymphs. The mixture of 30 ml. TEPP in 70 ml. water gave 95 per cent. mortality of *Aphis gossypii* Glov. in 24 hours, but only 11 per cent. of *Macrosiphum* (*Macrosiphoniella*) *sanborni* Gill., though mortality of the latter reached 95 per cent. in 48 hours.

HARTZELL (A.). **Additional Tests of Plant Products for insecticidal Properties and Summary of Results to Date.**—*Contr. Boyce Thompson Inst.* **15** no. 1 pp. 21–34, 54 refs. Menasha, Wis., 1947.

The author gives results obtained during further studies of the insecticidal properties of plants [*cf. R.A.E.*, A **28** 515 ; **30** 286 ; **33** 65], in which 135 species and varieties were tested against larvae of *Culex fatigans* Wied. (*quinquefasciatus* auct.), and summarises the results obtained during the whole investigation. Of a total of 400 plant products tested against larvae of this mosquito, the most toxic, with (in brackets) the median lethal doses expressed as parts original dry material per million, were an acetone extract of balm of Gilead [*Populus* sp.] (5·8), crude filicin (11), and acetone extracts of *Echinacea* (16), cubeb [*Piper cubeba*] (24), black pepper [*Piper nigrum*] (29), seeds of *Pinus taeda* (34), seeds of *P. virginiana* (56), seeds of ladino clover (*Trifolium* [*repens latum*]) (90), whole plants of *Lychnis coronaria* (135), and the seeds and leaves of *Koelreuteria paniculata* (245).

MINER (F. D.). **Rearing Technique for White Grubs.**—*J. Kans. ent. Soc.* **21** no. 2 pp. 58–59, 1 ref. Manhattan, Kans., 1948.

A method of rearing Lamellicorn larvae at outside temperatures that was devised in Arkansas and used for species of *Lachnosterna* (*Phyllophaga*) and *Cyclocephala* is described. Eggs laid by adults confined in jars of soil sunk in the ground and protected from rain are incubated in the insectary in pill boxes partly filled with packed soil. When about to hatch, they are placed singly in tilted shell vials in such a manner that when covered by a pinch of soil they remain visible through the glass ; a pinch of ground grapenuts is added for food, and then more soil in which rye grass [*Lolium perenne*] is sown. A week after the larva hatches, it is transferred to soil in a piece of glass tubing, 22 mm. in diameter and equal in length to the depth to which the larva is expected to descend during its development, and fitted at the bottom with a one-holed rubber stopper. The desired food-plant is planted, and the tube is inserted in a hole in the ground. Shelter is provided during rainy weather, and the tube is removed as required for observations. When the adult is about to emerge, the soil is smoothed and the tube corked. The temperature within it is the same as that of the surrounding soil, provided that the tube fits closely into the hole ; moisture content is less well controlled, but *Lachnosterna* and *Cyclocephala* appear to tolerate wide extremes and watering is determined by the needs of the food-plant. Plants grow well in the tubes and are replaced as soon as destroyed ; maize, which produces extensive root growth in a week or two, is used as the standard. Data obtained by this method agreed with field data as far as comparison was possible. The error due to keeping the eggs and newly hatched larvae indoors is considered to be small.

CALKINS (L. A.). **DDT in Juniper Mealy Bug Control.**—*J. Kans. ent. Soc.* **21** no. 2 pp. 60–62, 1 ref. Manhattan, Kans., 1948.

The DDT sprays that were used to control *Pseudococcus juniperi* Ehrh. on *Juniperus* in Kansas in 1945 [*R.A.E.*, A **35** 411] kept the trees free from infestation in 1946 and 1947, but left a heavy white deposit on them. Experiments using lower concentrations of DDT are described, and it is concluded that *P. juniperi* can be eradicated from heavily infested varieties of red cedar [*J. virginiana*] by a spray of about 1·5 per cent. DDT as a wettable powder with about 0·2 per cent. NNOR (a proprietary preparation containing rotenone with a synergistic wetting agent and spreader [*cf.* **30** 198]), provided that the trunk and foliage are thoroughly wetted. Protective spraying of *J. virginiana* with about 0·75 per cent. DDT is considered advisable in areas where the mealybug is present, since infestation has been very persistent, and though natural enemies and unfavourable weather are probably of importance in checking it, it can rapidly cause serious damage when suitable conditions arise.

RHOADES (W. C.) & BRETT (C. H.). **The Relation of Temperature in the Susceptibility of Grasshoppers to synthetic Insecticide Dusts.**—*J. Kans. ent. Soc.* **21** no. 2 pp. 66–70, 2 refs. Manhattan, Kans., 1948.

The following is based almost entirely on the authors' summary. Laboratory tests of the susceptibility of *Melanoplus differentialis* (Thos.), *M. bivittatus* (Say), and *M. m. mexicanus* (Sauss.) to dusts containing 5 per cent. γ BHC (benzene hexachloride), 20 per cent. chlorinated camphene [toxaphene], 10 per cent. chlordan, 20 per cent. DDT or 2 per cent. parathion at constant temperatures of 70, 80, 90 and 100°F. were made in Kansas in 1946. The parathion and BHC dusts were the most effective. Parathion was the more rapid in action and gave complete mortality in eight hours at 100°F., whereas 24 hours were required by γ BHC. A decrease in temperature increased the period required for complete mortality and reduced the percentage mortality for shorter periods in the case of both insecticides. A fumigant action was very evident in the case of γ BHC. Toxaphene and chlordan acted more slowly and required 48–72 hours to produce complete mortality at 100°F. High temperatures increased their effectiveness to a less extent. Chlordan was less effective than these dusts, but more effective than DDT. Unlike the other insecticides, DDT was somewhat more effective at low temperatures than at high ones. Its action was slow, and it did not give more than about 50 per cent. mortality. There was little difference in the relative susceptibilities of the three grasshoppers to the different insecticides.

ARMSTRONG (T.). **The residual Toxicity of some newer Acaricides to the Two-Spotted Spider Mite (Acarina : Tetranychidae).**—*Canad. Ent.* **82** no. 4 pp. 73–83. Guelph, Ont., 1950.

The following is substantially the author's summary. In greenhouse tests of acaricides begun in 1947 in Ontario against *Tetranychus bimaculatus* Harvey on scarlet runner bean (*Phaseolus coccineus*), sprays of 1,1-bis-(p-chlorophenyl) ethanol (also known as diparachlorophenylmethylcarbinol), ethyl p-nitrophenyl thionobenzenephosphonate and p-chlorophenyl p-chlorobenzenesulphonate remained effective for at least 14 days and dinitro-o-cyclohexylphenol at 5 oz.

per 100 gals. for 10 days. Dinitro-o-cyclohexylphenol at 2·5 oz. per 100 gals. was not nearly so effective. Di(p-chlorophenoxy)methane and β-chloroethyl-β-(p-tert. butylphenoxy)-α-methylethylsulphite were effective for approximately seven days, parathion for six days, dinitrocaprylphenylcrotonate for five days, and lauryl-2-thiazolinyl sulphide for 3–5 days. The ammonium and mono-ethanolamine salts of dinitro-o-cyclohexylphenol possessed good toxicity for approximately three days when used at 5 oz. per 100 gals., but were of little value at 2·5 oz. ; 2,4-dichlorophenyl benzenesulphonate showed very little residual action.

Allen (W. R.) & Berck (B.). **DDT Residues on Celery resulting from Dust Treatments for Control of the Tarnished Plant Bug.**—*Sci. Agric.* **30** no. 9 pp. 375–379, 6 refs. Ottawa, 1950.

The following is almost entirely the authors' summary. The distribution of DDT residues on celery plants treated with DDT dust totalling 4·2, 6·8 and 10 lb. actual DDT per acre during the season for the control of *Lygus oblineatus* (Say) was determined in Manitoba during 1947 and 1948. Several applications were made, the last being 13, 25 and 4 days before sampling, respectively. The DDT residues increased with rate of application and were greater at the bases of the leaf-stalks than at the distal ends ; deposits increased peripherally from the heart. The residues at the bases of the outer and (in brackets) the middle leaf-stalks were 24·1 (7·9) parts per million for 6·8 lb. DDT and 32·9 (26·0) p.p.m. for 10 lb. In all cases, residual deposits were low on the upper zone of outermost, middle and heart leaf-stalks. Residues on the leaf-stalks close to the heart were especially low. Removal of the outermost leaves at harvest appears to produce a large reduction in the total DDT residue. Commercial washing accounted for a reduction of approximately 40 to 60 per cent. of the remaining residue. The highest residual deposit left on the celery plants after washing was 4·5 p.p.m.

Allen (W. R.), Richardson (H. P.), Berck (B.) & Robinson (A. G.). **DDT Residues on Currants and Gooseberries.**—*Sci. Agric.* **30** no. 9 pp. 380–383, 2 refs. Ottawa, 1950.

Experiments in Manitoba have shown that DDT is effective for the control of the currant fruit-fly, *Epochra canadensis* Lw., and investigations were begun to ascertain spray schedules resulting in DDT residues on the fruit not exceeding 7 parts per million. The following is almost entirely the authors' summary. DDT residues were determined during 1948–49 on harvested red currants and on gooseberries that had been treated with different rates and combinations of wettable DDT in pre- and post-bloom sprays. Pre-bloom sprays did not apparently influence residues at harvest. The DDT residues 48–49 days after one post-bloom spray of 1·15 lb. DDT per acre, which is equivalent to a thorough application of 0·5 lb. DDT in 100 gals. water, approximated 3 parts per million. Two post-bloom sprays at the same rate, which have been recommended for control of the fruit-fly, resulted in similar residues 36–37 days after application. Residues were significantly increased and approached 7 p.p.m. 39 days after two post-bloom sprays totalling 4·6 lb. DDT per acre.

Simmonds (F. J.). **The Biology of** *Phytodietus pulcherrimus* **(Cress.) (Ichneumonidae, Tryphoninae) parasitic of** *Loxostege sticticalis* **L. in North America.**—*Parasitology* **38** no. 3 pp. 150–156, 16 figs., 13 refs. London, 1947.

A number of parasites, a list of which is given, were reared from cocoons of *Loxostege sticticalis* (L.) collected in the autumn in Montana in 1941 and Alberta in 1942 and 1945, and some were shipped to South Africa for liberation against *L. frustalis* (Zell.), on *Pentzia incana* [*cf. R.A.E.*, A **33** 74–75 ; **38** 160, 397, etc.]. The primary parasites comprised five Tachinids, three Braconids and five Ichneumonids, and the secondary parasites two Chalcidoids and a Staphylinid of the genus *Aleochara*. Studies on two of the primary parasites have already been noticed [**35** 294 ; **36** 28], and this paper is concerned with a third, *Phytodietus pulcherrimus* (Cress.), which was obtained in Alberta but not Montana. It was far the most abundant parasite in the material collected in 1942, but was relatively unimportant in 1945, though its incidence varied from field to field. The only hosts from which it has previously been recorded are *Phlyctaenia tertialis* (Gn.) [*cf.* **18** 116] and *L. similalis* (Gn.), but it is widely distributed in the United States and Canada. An account of its bionomics is given, together with descriptions of the immature stages, notes on the adult characters of the tribe and genus to which it belongs, and a list of its synonyms.

The parasite overwinters as a fully grown larva in a cocoon within that of the host ; the diapause could not be broken by keeping the larvae at a very low temperature for relatively short periods or by subjecting them to rapid changes of temperature. At 29°C. [84·2°F.], no emergence took place for over a month, when males emerged followed a week later by females. The sex ratio was approximately equal, but mating did not occur readily ; parthenogenesis was arrhenotokous. At 24°C. [75·2°F.], adults of both sexes lived for about 30 days when given water and raisins, the preoviposition period lasted 15–21 days and the egg, larval, prepupal and pupal stages about 7–8, 14–21, 2 and 15 days, respectively.

When ready to oviposit, the female paralysed a larva that was almost or quite full-grown, sometimes fed on the fluids exuding from the stinging punctures, and then laid an egg on one of the first two segments. The host soon recovered from the paralysis and either continued to feed or began to spin its cocoon. The parasite larva remained partly in the egg after hatching and in the exuviae after the first, second and third moults, reaching out to feed on the fluid exuding from punctures made by it in the skin of the host, but it came out during the fifth (final) instar and completely consumed the host. The duration of the instars varied considerably, and may be affected by the activity of the host. The parasite cocoon is formed within that of the host in the soil. The selection of large hosts by the ovipositing female, the length of the egg stage, and the mode of feeding of the larvae ensure that the host is not so weakened by parasitism that it is unable to construct its cocoon. No hyperparasites were reared from *Phytodietus*.

SMITH (R. W.) & FINLAYSON (T.U.). **Larvae of Dipterous Parasites of nymphal and adult Grasshoppers.**—*Canad. J. Res.* (D) **28** no. 2 pp. 81–117, 61 figs., 37 refs. Ottawa, 1950.

Detailed descriptions are given of the first-instar larvae of 19 Sarcophagids and the Anthomyiid, *Acridomyia canadensis* Snyder, and of the second-instar larvae of four Tachinids, all of which are parasitic in grasshoppers in Canada, with keys for their identification [*cf. R.A.E.*, A **32** 297]. The Sarcophagids include *Sarcophaga* (*Acridiophaga*) *caridei* Brèth., *S.* (*Tephromyiella*) *neuquenensis* (Blanch.) and *S.* (*Protodexia*) *australis* (Blanch.), which have been introduced from South America and released in various Provinces.

MATTHEWMAN (W. G.), HARCOURT (D. G.), CASS (L. M.) & FRIEND (W. G.). **The varietal Reactions of Cucumbers to DDT and Methoxychlor Dusts.**—*Canad. Ent.* **82** no. 5 pp. 102–111, 6 figs., 4 refs. Guelph, Ont., 1950.

The following is largely the authors' summary. In field experiments at Ottawa, a dust of 3 per cent. technical-grade DDT (setting-point 88–90·5°C.)

and a derris dust (1 per cent. rotenone) were applied to 12 varieties of cucumbers, nine applications being made in 1947, four and eight in 1948, and eight in 1949. In 1949, 3 per cent. dusts of methoxy-DDT (methoxychlor) and high setting-point DDT (minimum melting-point 103°C.) were added to the study. Three years' data on foliage injury, stunting of the plants, and yield showed that although all varieties tested were moderately or severely injured by technical DDT, six varieties were consistently susceptible, whereas six were tolerant.

Eight applications of DDT caused more injury than four, particularly to the susceptible varieties, but the increase was not proportional, indicating that the plants were more susceptible to DDT when young. DDT reduced not only the weight, but also the number of fruits, the two corresponding closely. High setting-point DDT caused considerably less injury than technical DDT to the six tolerant varieties, but only slightly less injury to the remainder. Methoxy-DDT was less injurious than either, but eight applications caused slight or moderate reductions in the yields of five varieties.

Each of the four insecticides gave adequate control of adults of *Acalymma vittata* (F.) in these experiments.

Fox (C. J. S.). **Preliminary Observations on the Control of Grasshoppers and related Insects on Flue-cured Tobacco with Chlordane Dust applied to the Field Margins.**—*Canad. Ent.* **82** no. 5 pp. 112–113. Guelph, Ont., 1950.

Some injury to the foliage of tobacco, particularly just before harvest time, is caused every year in south-western Ontario by grasshoppers, tree crickets and katydids [Tettigoniids], which breed in sod and woodland and along roadsides. In 1949, a 5 per cent. chlordan dust was applied at the rate of 22 lb. per acre to a strip, consisting of old sod with a few trees, bordering part of a field of tobacco to test its value as a protection. The dust was applied on 22nd June, and estimates of the damage by the insects in the protected and a control area were made about fortnightly, beginning on the day before treatment. The damage increased progressively in both areas, the percentages of plants with severe, moderate and slight injury in the treated and (in brackets) control area being 4·4 (34), 12 (26·8) and 38 (29·2) on 13th July, and 8·4 (62), 8·4 (17·2) and 50 (19·6) on 12th August. It is doubtful whether the dust gave commercial protection after 28th July, but a second application made 4–5 weeks after the first would probably have given satisfactory control.

Phillips (J. H. H.). **The Leafhopper *Typhlocyba froggatti* Baker as an Apple Pest in Ontario.**—*Canad. Ent.* **82** no. 5 p. 114. Guelph, Ont., 1950.

Trees in part of an apple orchard in Ontario that was sprayed regularly with DDT during 1946–48, but was not sprayed in 1949, became heavily infested with leafhoppers in that year and the leaves were severely injured by the end of August. Of the males reared from 200 nymphs collected on 11th August and other males collected on 29th August, almost all proved to be *Typhlocyba froggatti* Baker, though a few examples of *Erythroneura lawsoniana* Baker were also present. The distribution of *T. froggatti* in the world and in North America, where it has been recorded in Massachusetts, New York and Ohio, is reviewed. It is of some economic importance in Ohio, but has not hitherto caused serious damage in Ontario ; in 1948–49, it was found in small numbers breeding on apple, plum, sweet and sour cherry, and eastern choke cherry (*Prunus virginiana*) in the Niagara Peninsula. The damage caused by it resembles that due to *T. pomaria* McAtee [*R.A.E.*, A **29** 548], and its bionomics, which have not been investigated locally, also appear to be similar [**24** 63].

KENDEIGH (S. C.). **Bird Population Studies in the coniferous Forest Biome during a Spruce Budworm Outbreak.**—*Biol. Bull. Div. Res. Dep. Lds For. Ont.* no. 1, 100 pp., 32 figs., 47 refs. [Toronto] 1947.

About 100 sq. miles of forest dominated by balsam fir [*Abies balsamea*] and spruce in the Lake Nipigon area of Ontario were sprayed from the air in late May and June 1945 with 1 lb. DDT per acre as a solution in oil for the control of *Choristoneura* (*Archips*) *fumiferana* (Clem.) [*R.A.E.*, A **36** 33]. The observations here recorded showed that immediate bird mortality appeared to be negligible and that there was no effect on the size of the breeding population of birds or their success in raising their young.

DE SANTIS (L.). **Estudio monográfico de los Afelínidos de la República Argentina (Hymenoptera, Chalcidoidea).** [Monographic Study of the Aphelinids of the Argentine Republic.]—*Rev. Mus. La Plata* (N.S.) **5** Zool. no. 32 pp. 23–280, 52 figs., 75 refs. La Plata, 1948.

In the introductory sections of this work, the author discusses the systematic position, morphology, biology, distribution, and useful and harmful activities of Aphelinids and methods of capturing and preserving specimens, and reviews the more important literature on the classification of the family. This is followed by descriptions of the 35 species and 3 varieties recognised by him from Argentina, with information on their synonymy, local distribution, hosts and collection records, and keys to the subfamilies, genera, subgenera and species. Six of the species and two of the varieties are new. Of these, those of which the hosts have been specifically identified are *Prospaltella aurantii* var. *argentina* and *Aphytis dubius* from *Quadraspidiotus perniciosus* (Comst.) ; *A. dubius* var. *intermedius* from *Aspidiotus hederae* (Vall.) ; *Marietta haywardi* from *Lepidosaphes espinosai* Porter ; *Coccophagus pernigritus* from *Ceroplastes bruneri* Ckll. ; and *Ablerus ciliatus* from *Coccus hesperidum* L. *Encyrtophyscus*, gen. n., is erected for *Physcus flavoflagellatus* De Santis [*R.A.E.*, A **32** 353], and *Trichogrammatoidea signiphoroides* Brèth. [**4** 515] is stated from an examination of type material to be a synonym of *Aphytis longiclavae* (Merc.). The descriptions of the genus *Encyrtophyscus* and the species *Marietta haywardi* and *Coccophagus pernigritus* are published with the authorisation of E. E. Blanchard, to whom these names had been attributed in the literature, though they had not previously been described. *Ablerus ciliatus*, *Aphytis dubius* and *Prospaltella aurantii* var. *argentina* are the parasites previously identified by the author as *Ablerus molestus* Blanch. [**30** 216], *Aphytis mytilaspidis* (LeB.) [**27** 24] and *Prospaltella perniciosi* Tower [**27** 24], respectively. An earlier record of *Q. perniciosus* as the host of *Prophyscus latiscapus* De Santis [**33** 132] is stated to be doubtful.

JAMES (M. T.). **A Review of the Larvaevorid Flies of the Tribe Leskiini with the setulose first Vein (R_1).**—*Proc. U.S. nat. Mus.* **97** no. 3212 pp. 91–115, 1 fig., 7 refs. Washington [D.C.], 1947.

In this revision of the Tachinids of the tribe LESKIINI in which the first vein is setulose to or practically to the apex, all of which are known only from the New World, the author gives keys to the genera and species, descriptions of the adults, distribution records and host records so far as known. The species that parasitise hosts of economic importance are *Leskiella brevirostris*, gen. et sp. n., which has been bred from *Cydia* (*Grapholita*) *molesta* (Busck) and *C.* (*Carpocapsa*) *pomonella* (L.) and occurs in the eastern United States, *Genea aurea*, sp. n., which has been bred from *Tetralopha subcanalis* (Wlk.) in Florida and occurs in the eastern United States and Kansas, *Leskiomima tenera* (Wied.), which has been bred from *Desmia funeralis* (Hb.) in Washington, D.C., *C. pomonella* in Illinois, and *Acrobasis juglandis* (LeB.) in Florida, and, possibly, Massachusetts, and is recorded from the eastern United States, Quebec and Nova Scotia, and *Dejeaniopalpus texensis* Tns., which has been bred from *Desmia funeralis* in Washington, D.C., and Virginia and is recorded from the north-eastern United States, Texas and Quebec.

BLANCHARD (E. E.). **Descripciones y anotaciones de Microgastrinos argentinos (Hymenoptera).** [Descriptions and Notes on Argentine Microgasterines.]—*Arthropoda* **1** no. 1 pp. 6–22, 8 figs., 11 refs. Buenos Aires, 1947. (With a Summary in English.)

The parasites dealt with in this paper are all of the genus *Apanteles* and all from Argentina. Those described as new are *A. areolaris* from an unidentified Gelechiid on *Solanum bonariensis* ; *A. crouzeli* from *Cydia* (*Grapholita*) *molesta* (Busck) ; *A. desantisi* from *C. molesta* and *Tortrix* (*Argyrotoza*) sp. ; *A. lesbiae* from *Colias lesbia* (F.) ; *A. lizeri* from *Tolype proxima* (Burm.) and *T. guentheri* Berg ; *A. piceotrichosus* from *Plutella maculipennis* (Curt.) ; *A. subandinus* from *Gnorimoschema operculella* (Zell.) ; and *A. haywardi*, which was probably a parasite of *Euzophera melanostathma* Meyr. attacking *Tachardiella argentina* (Dom.). The Argentine parasite [of *Leucania* (*Cirphis*) *unipuncta* (Haw.)] previously considered by the author to be *A. militaris* (Walsh) [*R.A.E.*, A **25** 378] having proved to be a new species, he proposes the name *A. muesebecki* for it and gives characters distinguishing it from *A. militaris*. Comparison of type material has shown that *A. williamsoni* Blanch. [**23** 361 ; **25** 166, 788] is a synonym of *A. ayerzai* Brèth. [**8** 299 ; **9** 210], but Brèthes' record of the latter from *Colias lesbia* has not been confirmed and is considered doubtful.

SAUER (H. F. G.). **O combate às pragas e o aumento da produção das lavouras algodoeiras de São Paulo.** [The Control of Pests and the Increase of Production of Cotton Fields in São Paulo.]—*Biológico* **14** no. 2 pp. 23–37. São Paulo, 1948.

The author states that the principal cause of the vast losses of cotton experienced by growers in the State of São Paulo, Brazil, in recent years is infestation by insects. With the exception of *Alabama argillacea* (Hb.), little is done to control them and they have increased to enormous numbers. Mirids, especially *Horcias nobilellus* Berg [*cf. R.A.E.*, A **28** 9 ; **32** 107], have been the latest to cause trouble, and with their increase, the percentage loss, which was about 40, has risen to 70. Notes are given on the habits of the chief pests concerned, which are *A. argillacea*, *Aphis gossypii* Glov., *Eutinobothrus* (*Gasterocercodes*) *brasiliensis* (Hambleton), *Platyedra gossypiella* (Saund.) and the Mirids, and various methods of control that could be used, chiefly dusting and spraying, are reviewed.

BOX (H. E.). **Investigaciones sobre los taladradores de la caña de azúcar (*Diatraea* spp.) en Venezuela. Informe del progreso durante 1947–1949.** [Investigations on the Sugar-cane Borers (*Diatraea* spp.) in Venezuela. Progress Report for 1947–49.]—*Bol. téc. Div. Ent. Minist. Agric. Venezuela* no. 2, [5+] 60 pp., 2 maps (1 fldg. col.), 2 refs., multigraph. Caracas, 1950. (With a Summary in English.)

The following is based on the author's summary of this account of investigations in Venezuela in 1947–49 on moth borers of the genus *Diatraea* on sugar-cane, further to those already noted [*R.A.E.*, A **37** 273].

Those that are pests of sugar-cane in Venezuela are *Diatraea busckella busckella* Dyar & Heinr., *D. b. rosa* Heinr., *D. canella* Hmps., *D. impersonatella* (Wlk.) and *D. saccharalis* (F.). Their distribution is shown on a map and discussed. The two subspecies of *D. busckella* are major pests, but do not overlap, subsp. *busckella* extending west from Yaracuy State and subsp. *rosa* east from it, with a distance of some 12 miles between them. The danger of either being introduced into an area in which it does not at present occur is emphasised. *D. canella* occurs on sugar-cane throughout northern Venezuela up to an altitude of about 3,300 ft., but is of less importance than the others as the larvae prefer young ratoon shoots. *D. impersonatella* is widely distributed but infests sugar-cane only in Sucre and Lara States, where it is important locally, though one of the two previous records of it in Lara [*cf. loc. cit.*] is now stated to have been erroneous. It is common on wild grasses of the genus *Paspalum*. *D. saccharalis* is the most widely distributed and occurs from sea level to about 5,250 ft. It probably causes more than half the total damage due to *Diatraea* spp., but is conspicuously absent from some areas, which are noted. Other species of the genus studied were the maize borer, *D. lineolata* (Wlk.), which is also widespread, *D. pedibarbata* Dyar, which is the unidentified species A of the previous report [*loc. cit.*], was taken on *Typha angustifolia* and *Paspalum grande* and has not previously been recorded from Venezuela, *D. brunnescens* Box [*cf.* **23** 744] from *Pennisetum bambusiforme*, and four undescribed species. Numerous additions are made to the lists of food-plants, including *Cyperus ligularis* for *D. saccharalis*, and notes are given on infestations of sorghum and wheat by *D. saccharalis* and *D. lineolata*. Larvae of the latter were rarely found on sugar-cane. Preliminary life-history studies made in cages are recorded. The egg, larval and pupal stages lasted 6·5, 38–55 and 12–13 days for *D. impersonatella*, 5·5, 76 and 55 for *D. lineolata*, 6·5, 30–44 and 6–11 for *D. saccharalis* and 7·5, 84 and 9 for a hybrid between *D. b. busckella* and *D. b. rosa*.

Notes are given on the most important parasites encountered. Among the Hymenoptera, *Telenomus* sp. (apparently distinct from *T. alecto* (Crwf.)) was reared from eggs of *D. saccharalis* and *D. b. rosa*, *Apanteles diatraeae* Mues. frequently parasitised larvae of *D. lineolata* in maize, but was reared from no other host, and an undescribed species of *Apanteles* was bred from *D. pedibarbata*. Nine species of *Ipobracon* and *Agathis* (*Microdus*) are known to parasitise the larvae of various species of *Diatraea* in Venezuela, the commonest being *I. grenadensis* Ashm., *A. stigmatera* (Cress.), *A. sacchari* (Myers) and an unidentified species of *Agathis*. These attack the various sugar-cane borers indiscriminately, but have little effect. *Spilochalcis dux* (Wlk.) was reared from pupae of *D. impersonatella* in sugar-cane and *D. saccharalis* in maize, but was commoner on an undescribed species of *Diatraea* on the forest grass, *Setaria paniculifera*. Among the Diptera, *Zenillia palpalis* Aldr., which was previously known only as a parasite of *Castnia licoides* Boisd. in *Heliconia bihai* in British Guiana [**20** 568, etc.], was reared from large larvae of an undescribed species of *Diatraea* in *Pennisetum bambusiforme* and from *D. canella* in sugar-cane. *Sarcophaga lambens* Wied. (*Sarcodexia sternodontis* Tns.) was reared from *D. b. rosa* in sugar-cane and maize. The only Dipterous parasite of any economic importance, however, was *Paratheresia claripalpis* (Wulp), and a study was made of its bionomics and hosts. Two generations were reared in the laboratory by a technique involving the inoculation of host larvae with the larval parasites [*cf.* **29** 354, etc.], and at a temperature of 25·3°C. [77·54°F.], the gestation period of the females lasted 10 days, the larval period within the host 7–10 days, and the pupal stage 18–22 days. The host was *D. lineolata*, which is abundantly parasitised by *P. claripalpis* on maize in the field, but the parasite was also successfully reared in *D. b. rosa* and *D. saccharalis*, though not in *D. canella*, which it occasionally parasitises in the field. It is frequently attacked by the hyperparasite, *Thysanus dipterophagus* (Gir.), especially when reared from *D. lineolata* in maize ; other hyperparasites found are recorded.

The type of damage caused by *Diatraea* is described, and notes are given on its effects in different varieties of sugar-cane. In two milling experiments, medium-infested canes of two varieties (with 12·5 and 11·93 per cent. of the internodes infested) yielded 5·84 and 8·90 per cent. less sucrose than unbored canes.

A supplementary account is given of the distribution and economic importance of *Diatraea* in the various sugar-cane zones of Venezuela. The most severely infested areas are the Rio Tocuyo valley (Lara State) with an average intensity (internode infestation) of 29·6 per cent. in 1948 and 26·5 per cent. in 1949, due to *D. b. busckella*, *D. impersonatella* and *D. saccharalis* ; the Rio Turbio valley (Lara), with 16·7 per cent. and 14·8 per cent. for the same periods, due to *D. b. busckella* and *D. saccharalis* ; and the valleys of the Rio Aragua and upper Rio Tuy (Aragua), with an average intensity of 18·5 per cent. for the period 1947–1949, due to *D. b. rosa* and *D. saccharalis*. Special attention is drawn to the situation at Central Matilde, Chivacoa (Yaracuy State), which lies at the extreme eastern limit of the range of *D. b. busckella* (and where the canes suffer considerable damage from that subspecies, as well as *D. saccharalis*), but within less than 12 miles of the western limit of *D. b. rosa*. The large properties attached to the Central Tacariga (Carabobo) have been periodically examined, but the only borer of economic importance is *D. b. rosa*. To date, *D. saccharalis* has not been found in sugar-cane in this locality, although it breeds regularly in maize nearby, and is found in sugar-cane at an estate less than 12 miles away. In Monagas and Sucre States, the relatively low general infestation, due mostly to *D. impersonatella* or *D. b. rosa*, is not of economic importance. The Andean region (Trujillo and Mérida States) has received further attention, and it is now known that *D. b. busckella* is the most important sugar-cane borer in the Mérida-Egido zone, whilst *D. saccharalis* is comparatively scarce. There is a conspicuous drop in infestation in the higher altitudes (above 1,400 ft.) in the Andean region, where *Diatraea* damage is at a minimum. A graph is given showing the relative grades of borer infestation in the principal sugar-cane zones, and it is stated that a project for the biological control of the borers is under consideration.

LAMAS C. (J. M.). **El gorgojo negro del plátano** *Cosmopolites sordidus* **G. El nuevo y principal insecto dañino del plátano y su existencia en el Perú.** [The Black Banana Weevil, *C. sordidus*. A new and important Pest injurious to Bananas and its Occurrence in Peru.]—*Bol. Estac. exp. agríc. La Molina* no. 34, 14 pp., 4 pls., 22 refs. Lima, 1947 ; also as *An. IV Conv. agron. reg. Oriente 1945* pp. 303–315.

Cosmopolites sordidus (Germ.) was found on banana in Peru for the first time in 1944, when infestations occurred in the Carabayllo and Rimac Valleys, but in no other areas surveyed. It was nowhere very injurious, which may have been due to the scattered distribution of plantations in the two valleys and their usually good state of cultivation, although some controlling effect might have been afforded by natural enemies or the climate of coastal Peru.

The weevil appeared to have been present for several years. Its distribution, bionomics and control, including natural enemies, are reviewed from the literature, and the text is quoted of a quarantine regulation dated 26th

September 1945 designed to prevent its spread on plant material from the two valleys.

Wille (J. E.) & Guzmán (V. L.). **Informe final sobre la aplicación industrial del insecticida "DDT" contra la mosca de la fruta en la huerta de la Estación Experimental Agrícola de La Molina en la temporada 1946–47.** [Final Report on the commercial Use of the Insecticide DDT against the Fruit-fly in the Orchard of the Agricultural Experiment Station of La Molina in the Season of 1946–47.]—*Inf. Estac. exp. agríc. La Molina* no. 67, 7 pp. Lima, 1947.

Following the promising results given by sprays of 0·5 per cent. DDT against *Anastrepha* sp. in Peru in 1945–46 [*R.A.E.*, A **36** 134], the whole of an experimental orchard consisting largely of apple, but including fruit trees of several other sorts, was sprayed in 1946–47. Ten applications of 0·5 per cent. DDT from proprietary products were made at fortnightly intervals beginning on 28th November, and all the fruits harvested were free from infestation with the exception of those from 4 out of 40 peach trees. Infestation reached 100 per cent. in neighbouring untreated orchards. The profitability of the treatment is discussed, and it is concluded that the cost is well justified.

Garcés O. (C.) & Gallego (F. L.). **Algunas enfermedades y plagas que atacan al manzano en Antioquia.** [Some Diseases and Pests that attack Apple in Antioquia, Colombia.]—*Rev. Fac. nac. Agron.* **7** no. 28 pp. 443–494, 20 figs., refs. Medellín, 1947.

Over half this paper is devoted to insects that attack apple in the Department of Antioquia, Colombia, and notes varying in amount of detail are given on their bionomics and control. Those that develop in the fruits are *Cydia* (*Carpocapsa*) *pomonella* (L.), which is present throughout the year and completes a generation in about six weeks, but is commoner on the wild *Rheedia madruño*, an Ephydrid, *Discocerina* sp., possibly *D. nitida* Cress., and a Chloropid, *Hippelates pallipes* (Lw.), the larvae of both of which are stated to tunnel in the fruits, preventing their development, and *Anastrepha* sp. and *Rhagoletis* sp., possibly *R. pomonella* (Walsh). The leaves are attacked by the Saturniid, *Automeris janus* (Cram.), of which the egg, larval, prepupal and pupal stages last 12, 30–32, 1½ and 30 days, and by the Limacodid, *Phobetron hipparchia* (Cram.), which is polyphagous, and the tender shoots by the Membracid, *Aethalion reticulatum* (L.). Other pests present are *Eriosoma lanigerum* (Hsm.), which is very injurious but against which *Aphelinus mali* (Hald.) has been introduced and used with some success, adults of *Macrodactylus flavolineatus* Guér., the Jassid, *Oncometopia undata* (F.), which sucks the flower buds, and a weevil of the genus *Compsus*, of which the adults feed on the tender tissues and buds, though they are not usually common enough to be important.

Cheu (Seh-pong). **Field Experiments on the Use of Tea-seed Oil Soap against Sugar-cane Woolly Aphis.** [*In Chinese.*]—*Nung Pao* **12** no. 2 pp. 14–16, 4 refs. 1947.

In field experiments in Kwangsi in 1942–44, a spray of 0·5 per cent. tea-seed oil soap applied to sugar-cane infested by *Oregma lanigera* (Zehnt.) by means of a bucket sprayer gave average mortalities of 93·4–99·9 per cent. [*cf. R.A.E.*, A **37** 75].

CHEU (Seh-pong). **Studies on the Soybean Pests of Kwangsi. II. The Bean Plataspid.** [*In Chinese.*]—*Nung Pao* **12** no. 4 pp. 10–13, 1 graph, 4 refs. 1947.

In this paper, which is one of a series, an account is given of observations in 1940–43 on the bionomics and control of the Pentatomid, *Coptosoma punctatissimum* Mont., which is a pest of soy beans in Kwangsi [*cf. R.A.E.*, A **37** 76]. Overwintered adults appeared in mid-March and attacked *Cajanus cajan*, *Millettia pachycarpa*, *Tephrosia candida* and *Malva crispa.* They oviposited on these plants during late April and May, and the first generation was completed in early June. A week or two later, the new adults migrated to soy bean, yam bean (*Pachyrhizus erosus*), *Dolichos lablab*, lima bean, *Phaseolus mungo* and cow peas (*Vigna unguiculata* (*sinensis*)) on which they oviposited in early July. Second-generation adults emerged between mid-August and mid-September, and under favourable conditions, a third generation was produced in late September and October. At the end of September, the adults began to migrate to farm buildings, crop refuse and other suitable shelter, in which they passed the winter.

Sprays containing nicotine, pyrethrum or derris were ineffective at ordinary concentrations, though the last two killed considerable numbers of the bug when used at very high concentrations. Hand collection, preferably in late May, when first-instar nymphs are congregated on the main stems of *Cajanus cajan*, is thought to be the most practicable measure for protecting soy beans in Kwangsi.

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WILSON (G. F.). **Pests of Flowers and Shrubs** [in England].—*Bull. Minist. Agric.* no. 97 (revd.), [4+]105 pp., 40 pls., text illus., many refs. London, H.M.S.O., 1950. Price 4*s.* 6*d.* [*Cf. R.A.E.*, A **25** 638.]

Elenco delle principali specie di insetti che hanno prodotto infestazioni degne di nota in Italia durante l'anno 1947. [A List of the principal Species of Insects that caused Infestation worthy of Notice in Italy in the Year 1947.]—*Redia* **32** pp. xxv–xxx. Florence, 1947. [*Cf. R.A.E.*, A **36** 141.]

SAUER (H. F. G.). **Constatação de Himenópteros e Dípteros entomófagos no Estado de São Paulo** [lists of parasitic and predacious Hymenoptera and Diptera in São Paulo, showing their hosts and collection records].—*Bol. fitossanit.* **3** (1946) no. 1 pp. 7–23. Rio de Janeiro, 1947.

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DIRSH (V. M.). **A new injurious Indian Grasshopper (Orthoptera, Acrididae)** [*Indomerus noxius*, gen. et sp. n., damaging wheat in Ajmer].—*Bull. ent. Res.* **41** pt. 3 pp. 599–601, 7 figs. London, 1951.

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